ANALYSIS OF FEDERAL EXPENDITURES ON R&D

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1. Introduction

1.1. Purposes of Analysis

As follows from the Concept of fiscal policy in the field of expenditures developed by the Russian Ministry of Finance one of the major policy objectives of the Russian Government is to create an efficient fiscal system in Russia aiming to facilitate economic growth. A fiscal policy, to be efficient, should be based on the following basic principles:

- Ensure unconditional fulfillment of obligations arising in the sector of public and municipal administration;
- The focus of public expenditures should be more on achieving social and economic end results;
- A priority should be given to medium-term budget planning that should reflect strategic economic policy objectives;
- Make use of bidding principles for budget resource allocation;
- Information on spending operations at all levels of the fiscal system should be transparent for and accessible to the public.

Financing of fundamental research and promotion of scientific and technological progress had been and continues to be a fairly large sector of Russia's federal budget (Box 1.1). Higher sector efficiency is of paramount importance for achieving major economic policy objectives of Russia.

For appropriate measures to be devised and taken one should first review the current state of and budget process within the sector.

The objectives of the analysis of federal budget expenditures on fundamental research and promotion of scientific and technological progress were to:

(i) Assess the current state of and changes in funding of the R&D sector from the federal budget; based on the available statistics and other information, clarify what should be the focus of the study;
(ii) Explore the case for as well as purposes and forms of government interventions in the R&D sector in Russia;
(iii) describe budget process in the field of funding of the R&D sector;
(iv) identify major problems and shortcomings in public funding of fundamental research and promotion of scientific and technological progress; define the scope for budget process improvement in the sector;
(v) develop recommendations on how to improve efficiency of federal budget expenditures on fundamental research and promotion of scientific and technological progress in the short and long run.

1.2. Information sources

This overview is based on information obtained from official statistical data of Goskomstat of Russia; and information provided by various Departments of the MinFin of Russia and Ministry of Industry and Science of Russia. Unless otherwise expressly stated, all estimates and calculations provided herein have been derived from those agencies' statistics for 1999-01 or other years, as appropriate. Besides, official publications such as federal budget laws (attachments), federal investment programs, reports on budgetary and extra-budgetary funds, and other documents were used for the study.

Box 1.1

The level of public funding of science is commonly compared with the so-called "social block" items (education, healthcare, culture, and social policy). The Table below reports comparative data for those and other items.

Federal budget funding of fundamental research and promotion of scientific and technological progress *vs.* other public expenditure items

Items of functional classification of federal budget expenditures	***Amount (RUR MM) (1999 actual)***	***% of federal budget expenditures***
Expenditure Totals	**664 673,8**	**100,00**
Fundamental research and promotion of scientific and technological progress	*11 196,8*	*1,68*
Public administration	14 832,4	2,23
Law enforcement and national security	55 445,5	8,34
Industry, energy and construction	16 921,3	2,54
Education	20 945,4	3,15
Healthcare and Physical Training	10 141,0	1,52
Social policy	49 096,0	7,39
Culture, arts and cinematography	2 876,6	0,43
Transport, roads, telecommunications and IT	941,6	0,14

Source:: http://www.minfin.ru/isp/11.htm

It should be born in mind that regions devote a much larger share of their budget resources to the "social block" than does the Federation. In Russia's consolidated budget projections for 2001 territorial budgets for Education and Culture are almost 4 times as great as the federal budget figures, while regional spending on Healthcare is projected to be over 7 times that of the Federation. Territorial expenditures under Section "Fundamental Research and Promotion of Scientific and Technological Progress" account for a mere 5 percent of consolidated budget expenditures. Hence, the objective of higher efficiency of expenditures on this function as opposed to others is different in that it primarily has to deal with the federal budget.

1.3. Structure of the Report

The Report consists of 6 Sections (Chapters) that correspond to major objectives of the study.

In Section 2 we discuss whether there is a case for policy interventions in the science sector and what should be the purposes and forms of such interventions in the Russian context.

The Section offers a clearer view of the focus of study and a general description of Russia's R&D sector and the way it is regulated by the government.

Section 4 describes how the R&D sector is financed from the federal budget in terms of levels and quality.

Section 5 discusses institutional framework of the budget process vis-à-vis government financing of the science sector.

Section 6 identifies major problems and shortcomings of government financing of fundamental research and promotion of scientific and technological

progress and offers recommendations on how to improve the efficiency of federal budget expenditures on fundamental research and promotion of scientific and technological progress in the short and long run.

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List of abbreviations used throughout the Report

RF – Russian Federation
Ministry of Industry and Science – Ministry of Industry, Science and Technologies of the RF (established in 2000)
MoS – Ministry of Science and Technologies (before 2000 was reorganized several times with its name changed accordingly)
MoE – RF Ministry of Education
MinFin – RF Ministry of Finance
MoED – RF Ministry of Economic Development and Trade
Goskomstat – RF State Committee for Statistics
RAN – Russian Academy of Sciences
RAMN – Russian Academy of Medical Sciences
RASHN – Russian Academy of Agricultural Sciences
RAACS – Russian Academy of Architecture and Construction Sciences
RAO – Russian Academy of Education
RAH – Russian Academy of Arts
FTP – Federal target programs
FTSTP – Federal Target Program "Research and Development in priority areas of civil science and technologies"
RFFI – Russian Fund of Fundamental Research
RGNF – Russian Humanitarian Research Fund
FSSB – Fund for promotion of small business in the area of science and technologies
RTDF – Russian Technological Development Fund
PSC – State Scientific Centers of the Russian Federation
R&D – Research and Development
FR – fundamental research
AR – applied research

2. A case for policy interventions in the R&D Sector

2.1. Economic grounds

2.1.1. Spillovers

It is customarily believed that R&D conducted by an economic agent tend to spill to a great extent over to other agents through dissemination of useful knowledge that over time inevitably becomes common property despite any attempts of the authors to retain monopoly over their discoveries or inventions. Therefore, with private rights to new knowledge remaining unprotected for a fairly long time and private investments in scientific research leading essentially to creation of public good, an economy based on completely free market principles may be confronted with underproduction of knowledge, as corroborated by numerous empirical studies. This is particularly true of fundamental knowledge that is most universal of all. Often, the above circumstance is used as an argument in favor of spending substantial public resources on support of research in developed and many developing economies.

Those traditional beliefs are rooted in the so-called linear model of development and dissemination of knowledge. In that model the fundamental science is thought of as an autonomous source of scientific and technological development. New knowledge it produces is further translated by the applied science into technical and technological innovations.

Recently the above model has come under scathing criticism and is no longer thought of as incontrovertible. A different model of knowledge development has been gaining an increasingly wide acceptance, as proven by numerous facts: applied scientific research and technological development taking place in the commercial sector give rise to solvent demand for fundamental research. Furthermore, their demand for highly skilled researchers encourages private firms to create and finance research and scientific-information infrastructure, including creation of fundamental science infrastructure and ways and means for public information exchange. In any event, it has not been empirically proven so far that the rate of economic growth is in any way linked to the level of government financing of science (R&D). Besides, the previous assertion that an economy may be confronted with "underproduction" of fundamental knowledge is largely dependent on the criterion of "adequate level of production" chosen. But whatever it may be such a criterion or standard is bound to be subjective and in all practical cases has a significant political implication.

2.1.2. Maintenance of competitive strength of national economy

Another economic argument in favor of government incentives for R&D is the need to build up the competitive strength of national economy that is largely dependent on the ability to create and replicate advanced high technologies (Box 2.1). Central to this reasoning is not only spillovers, but also allegedly weak saving habits of the population or its overly strong present orientation to the long-run detriment of investments in high technology projects requiring large-scale investments of capital and involving a high degree of risk. On the other hand, high risks keep most of private businesses away from those projects. Therefore, by re-distributing resources to the R&D sector through its budget the government compensates for this market failure.

As a number of studies have shown, it is typical of both the population and business elite in present-day Russia to have a fairly strong present orientation to the detriment of the future. This results in a shortage of capital resources available for high technologies development and constitutes the strongest economic argument in favor of government interventions in the R&D sector.

Box 2.1. Competitive strength of national economy as a purpose of government intervention efforts in the R&D sector

For many developed countries the purpose of state support of science is to strengthen the competitive position of national economy. For example, the UK Government provides the following explanation of why it finances scientific research:

> Science and technology are a vital source for a successful economy. Relative advantages will be increasingly related to the processes of generation and use of knowledge for the purpose of creating innovations. The number of studies conducted in a country is a most important factor that determines country's innovation activities […]. In view of the above the Government has taken steps aimed at wider use of results of scientific research for commercial purposes and encouragement of private investments in R&D. (*HM Treasury: Spending Review 2000*, Chapter 34)

Similarly, the Concept of fiscal policy in the field of expenditures of the RF Ministry of Finance sets out the following fiscal policy objective:

> The focus of public expenditures should be on financing research that contributes to higher economic and scientific capacity of the State.

It should be pointed out that using the need to maintain competitive strength of the economy as a reason for government interventions in the R&D sector implies not so much the support of fundamental research but incentives for the applied science and innovations.

But the case for this approach is weakened in that it is beyond reason to think that the government will be better able to define priority areas for financing of commercial developments than the private sector. In any case it has to deal with a critical question of what should be forms and ways of government intervention. Direct government funding may prove to be inefficient. In this case it could be more appropriate to provide tax incentives to businesses investing in R&D.

Tax incentives for encouragement of R&D do exist in Russia (or at least existed until June 2001 when all exemptions from enterprise profits tax had been abolished). However, revenue shortfalls from tax privileges for R&D under current budget classification are not treated as public expenditures under Section 06 "Fundamental Research and Promotion of Scientific and Technological Progress", which hampers any quantitative assessments of the efficiency of this practice in Russia based on currently available fiscal and statistical accounting reports.

2.2. Political reasons

Analysis of statements made by politicians and experts in public suggests the following political motives for state support of R&D in Russia:

- support of defense potential of the State;
- preservation of historical heritage and development of national culture of peoples inhabiting Russia;
- keeping up Russia's traditional image of a country with rich scientific and cultural heritage and potential.

2.2.1. Support of defense potential of the State

This goal shall be achieved through public funding of R&D for military purposes and does not explain the need for state support of civil science.

At the same time, appeals to national defense needs by various lobbying groups may result in substantial waste of budgetary resources and even support of pseudo-scientific and religious theories and practices at taxpayers' expense (Box 2.2.).

Box 2.2.1. Government financing of pseudo-scientific research and projects for defense purposes

Bioenergy weapon

In 1985 a Center for non-traditional technologies was set up in the USSR State Committee for Science and Technology. The research carried out in the Center was financed through the Military Industry Commission of the USSR Council of Ministers, Ministry of Defense, KGB and other agencies. The focus of research was the so-called torsion radiation that allegedly allowed selective transmission of information to any person to the extent that it could influence his/her

physical state and even kill. In 1991 the Center was shut down following a decree of the Supreme Soviet of the USSR. Total loss for the State amounted to RUR 500 MM.

Plasmic weapon

In early 1990s a new means of fighting against ballistic missile warheads was widely advertised as setting up plasmic barrier on their way and thereby diverting them from their trajectory. According to an independent opinion of Russian and American physicists the idea had no practical value. Nevertheless, in 1993 the Russian Government allocated for its development RUR 20 bn from the reserve fund.

(Source: E.P. Kruglyakov, *Highway-robber scientists*, Moscow, *Nauka*, 2001, p. 52-53, 57).

2.2.2. Preservation of historical heritage and development of national culture of peoples inhabiting Russia

The above is a declared goal of funding of a significant part of scientific research in the humanitarian area and support of academic humanitarian institutions.

However, the issue of whether the government should or should not intervene in the area of production of humanitarian knowledge has been very poorly studied thus far. Practice has shown that such intervention may cause significant damage, in particular by adding political dimension to humanitarian knowledge (Box 2.2.2). The current history of Western countries provides many examples of how "politization" adversely affects not only humanitarian but also natural sciences.

2.2.3. Keeping up Russia's traditional image of a country with rich scientific and cultural heritage and potential ("national prestige" motivation).

This motivation causes funds to be devoted not so much to scientific research per se but to support of the existing research infrastructure to the eventual detriment of the image of science and research potential.

Box 2.2.2. Adverse effect of policy interventions in humanitarian research. Reform of Russian spelling

Over the course of the 20th century multiple fairly broad-ranged spelling reforms had been undertaken in the USSR. Experts have assessed their overall end-result as negative. Nevertheless, at present the RAN Russian Language Institute and RAN Spelling Commission are poised for a new reform. Although its declared goal is to simplify the Russian written language, independent experts believe that the reform is more likely to bring about total confusion and completely mislead Russian native speakers. The reform is being prepared behind closed doors with no account taken of what native speakers of the standard literary language think of it. In addition, the reform, if carried out, will result in a dramatic increase of public expenditures as it will involve publishing revised text-books, revision of curricula, etc.

2.3. International experience

Governmental regulation of science in industrialized countries takes different forms that can be arbitrarily grouped as follows:

1. Creation of public research institutions supported from the government budget and supplying results to a certain group of potential users.

For instance, in the U.S. this includes the so-called national laboratories doing research in the area of defense, power engineering and healthcare.

2. Non-repayment government grants to scientists (groups of researchers) for research that occurs outside public research sector.

Beneficiaries of the said grants may be scholars or groups thereof working in universities and other public and private non-profit organizations. Grants are awarded through tenders against reporting of research progress, openness of results obtained, etc.

3. Creating preferential conditions for private businesses investing in R&D.

This group of measures includes, amongst others:

- tax and depreciation privileges;
- matching grants;
- government guarantees for loans.

4. Legislative measures aiming to improve private sector cost efficiency in the R&D field and implementation of R&D results.

Amongst others, they include:

- intellectual property protection system;
- mechanisms of transfer of scientific results, received with the financial support of the government, to businesses;
- awards of government contracts for production of high-tech products for government needs (military contracts);
- development of legislative framework for venture fund investments.

Forms of government regulation falling under the first two groups can be lumped together as "direct government funding of R&D". In developed market economy countries the share of the government in total financing of science ranges between 23 percent (Japan) and 45 percent (France). This share is much higher in case of fundamental science and research in the area of defense. The U.S. (50 percent) and UK (37 percent) are leading the way in what concerns the share of defense research in total public expenditures on science. In Russia the government share of total funding of civil science amounts to 50 percent which is in excess of what is being spent on it by governments even in most of the developed countries[1].

The other two groups may be pooled to form a category of "indirect forms of government incentives for R&D". The most widespread measure of indirect regulation in the science sector is deduction of private sector expenditures on R&D from the taxable base that may as well be interpreted as a special form of government subsidies. Taxation privileges in use in developed countries constitute a system of mutually complementary tax incentives, each performing specific economic function.

Despite the diversity of national alternatives, the system of incentives is principally tied to the corporate income tax and depends on the level of innovation activities. Incentives include, *inter alia*, deductions of current expenditures on science from enterprise's taxable base; accelerated depreciation of equipment used for research purposes; tax credits, i.e. reduction of corporate income tax liabilities by a certain percentage of actual qualified expenditures on science.

[1] *Russian science in figures, CISN of the Ministry of Industry and Science of Russia, Moscow, 2000.*

Review of particular types of tax incentives has shown that as a form of encouraging private activities in the R&D sector they do have a positive influence on private sector expenditures on research[2].

2.4. Conclusions and Recommendations

A strongest case for government intervention in the science and R&D sector from the standpoint of the economy is to ensure a stronger competitive edge of the national economy within the framework of international division of labor. However, to a certain extent it runs counter to the proclaimed priority of the fundamental research support over aid to applied science.

Admittedly, it is yet to be determined how much government regulation methods currently in use are effective in ensuring a higher competitive strength of national economy. It is not improbable that indirect incentives such as tax breaks that are already in use will ensure a much more efficient support of the R&D sector than does direct financing by the government.

In addition to economic motives per se, in the Russian society there are widely spread sentiments in favor of political reasons for state support of science such as strengthening of national defense potential, preservation and development of national culture, and support of national prestige. These have not been formally established as special objectives of government activities in the field of science and commonly have an informal impact on decision making, which results in science being overshadowed by politics and paves the way to lobbying by narrow groups and corruption.

Recommendations

(i) Make a more in-depth analysis of the existing forms of state support from the standpoint of their efficiency in enhancing the competitive strength of national economy;

(ii) The number of unofficial political motives and their influence on decision-making about policy interventions in the R&D sector should be reduced as appropriate. Reduce as much as possible the list of facilities subject to public financing by reason of national prestige. Formalize as much as possible procedures for accommodating political reasons in decision-making.

3. Science Sector of Russia's Economy: Quantitative and Qualitative Description

3.1. Terms and definitions used for description of the science sector of Russia's economy

Terms and definitions used in the existing regulatory acts in statistics and in the government regulation of the R&D sector are to a large extent at variance and often incompatible with each other. In particular, there is difference in terms used in:

- federal legislation on science;
- budget classification;

[2] Mamuneas Theofanis P. and Nadiri M. I. "Public R&D policies and cost behavior of U.S manufacturing industries" *Journal of Public Economic* No. 63 (1996) pp.57-81.

- sectoral regulatory acts;
- official statistics.

General terms defining scientific activities were introduced in the Law "On Science and Government Scientific and Technological Policies" (Federal Law #137-FZ dated 23 August 1996) (hereinafter referred to as the "Law on Science"). Since the law is not a regulatory act of direct effect, the assumption was that at some point in the future some of its provisions would be amplified and supplemented with by-laws. However, lack of coordination in law-making efforts gave rise to interpretations that are at variance not only with provisions of laws, but also with actual development needs of the R&D sector. The meaning of terms used in by-laws (instructions and regulations of various departments), such as "scientific and technological complex", "science and innovation sphere", "innovation activities", "scientific research and experimental developments", are rather vague and do not have a one-to-one correspondence to the R&D definition used in the existing laws, including those regulate public sector.

Inaccuracy and incompleteness of terms and definitions, are for example, manifest in determination of the numbers and composition of scientific institutions. Under the law only a corporate entity may be a scientific institution, thus leaving out a significant portion of scientific activities of higher educational institutions and manufacturing enterprises. Conduction of scientific and/or scientific and technical activities as the core activity is recognized as a key criterion of a scientific institution. However, no distinction is made between individual types of such activities that are quite versatile (from scientific and technical activities of museums and botanic gardens, standardization and quality control, to scientific and technical advisory, and patent and licensing business). This leads to unreasonable expansion of the boundaries of scientific activities per se. Another criterion – training of scientific personnel – on the contrary, hampers inclusion of institutes (design, engineering and technological institutes) in the group of scientific institutions as they don't provide post-graduate and/or doctorate courses, as do scientific organizations.

After the state science statistics in the late nineties switched to new rules of survey in line with international standards, R&D statistics started to use its own terms and definitions. A target for surveys were not scientific institutions at large but only those of them that engage in R&D. Although it makes perfect sense to single out this type of scientific and technical activities the boundaries of the state R&D statistics after the adoption of new rules have shrunk beyond the boundaries of science set by the Federal Law on Science. (See also Box 3.1).

Section 4 gives examples of inconsistencies between terms used in the Law on Science and the budgetary classification.

Box 3.1. Distribution of organizations performing R&D by sectors of activities in state R&D statistics

The current distribution by sectors of activities – public sector, business sector, higher education sector and private non-profit sector – was adopted in accordance with international standards. The public sector includes organizations responsible for public administration and meeting of public needs in general, while business sector includes organizations engaged in production of goods and services for the purpose of selling the same in the market. These terms differ from the generally accepted ones and are misleading. For example, many institutions that are traditionally included in the public sector in Russia, for the most part operate under commercial contracts (referred to also as "*khozdogovor*"). On the other hand, the "business sector" in Russia traditionally includes private and privatized entities that perform R&D, irrespective of the purpose and financing sources of their activities.

The problem of terms and definitions imposes significant restrictions on the scope of application and analysis of official statistical data. Their accuracy and comparability are apparently not high enough. Therefore, a researcher is forced to confine himself to description of fairly approximate proportions and general trends.

3.2. Numbers and composition of organizations performing R&D

Changes in development conditions and factors resulted in shrinkage of Russia's scientific and technical complex accompanied by dramatic changes in its qualitative characteristics and structural parameters.

Table 3.1. Number and composition of organizations performing R&D (at year end).

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Change over the period, % (1990 – 100%)
Total number of scientific organizations Including:	4 646	4 564	4 555	4 269	3 968	4 059	4 122	4 137	4 019	4 089	-12
- research institutes	1 762	1 831	2 077	2 150	2 166	2 284	2 360	2 528	2 549	2 603	+48
- design institutes	937	930	865	709	545	548	513	438	381	360	-62
- designing and developing institutes	593	559	495	395	297	207	165	135	108	97	-84
- pilot plants	28	15	29	17	19	23	24	30	27	30	+7
- higher educational institutions	453	450	446	456	400	395	405	405	393	387	-15
- industrial enterprises	449	400	340	299	276	325	342	299	240	289	-36
- other	424	379	303	243	265	277	313	302	321	323	-24

Source: State Statistics Committee of the Russian Federation

This data leads to the following conclusions.

1) The number of organizations performing R&D has been dwindling during the 90-s. However, their reduction progressed at a lower pace than did R&D financing over the same period (See below), or major macroeconomic parameters (GDP, investments, etc.).

2) The composition of organizations performing R&D has also undergone significant changes. In particular, privatization in the industrial sector resulted in privatization of numerous pilot plants, design bureaus and other institutions that had been traditionally involved in R&D. Many of them proved unable to operate in the market environment and eventually have ceased to exist or have been reorganized.

Concurrently, new scientific organizations have come into being to cater for the needs of the emerging private sector.

3) The number of research intuitions has dramatically increased since 1992. This growth was largely due to upgrading of the status of units within the organizational structure of existing research institutions most of which were owned by the government. It is noteworthy that among various types of institutions currently involved in R&D, the share of government-owned institutions is the highest (over 70%) precisely among research institutions that have largely continued as government-owned institutions since the USSR era. Therefore, changes in their numbers reflect not so much the market situation in the R&D sector, as a change of administrative-distribution relationships against the background of disintegration of command administration system of R&D management.

3.3. Staffing of the R&D sector

Table 3.2. Number of employees involved in R&D (at year end)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Per 10,000 jobs in economy (persons)	258	227	213	186	162	160	151	145	135	137
Total ('000 persons)	1943	1677	1532	1315	1106	1061	990	934	855	872
Total (%). including:	100	100	100	100	100	100	100	100	100	100
- researchers of which:	51,1	52,4	52,5	49,0	47,5	48,9	48,9	48,7	48,8	48,2
Doctors of sciences	1,6	1,8	2,2	2,8	3,45	3,7	4,0	4,4	4,9	5,0
Candidates of sciences	12,8	13,4	13,9	16,3	18,5	18,7	19,2	19,7	20,5	20,1
- technicians	12,1	12,0	11,8	10,2	10,4	9,6	8,9	8,6	8,8	8,3
- support staff	26,4	24,8	24,9	28,8	26,3	25,9	26,2	26,2	25,7	27,0
- other	10,5	10,9	10,8	11,9	15,7	15,7	16,0	16,5	16,8	16,49

Table 3.3. Researchers' age structure variations

Age group	Researchers, total, %		Including in research institutions, %	
	1994	1998	1994	1998
Total, including:	100	100	100	100
Up to 29 years	9,2	7,7	8,7	7,4
30-39 years	24,0	18,1	23,2	17,5
40-49 years	31,7	28,3	31,3	27,7
50-59 years	26,1	27,9	26,7	28,4
60 years and above	9,0	18,0	10,0	19,1

Table 3.4. Average monthly nominal accrued wages of employees in various sectors of the economy versus national average level (%)

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Average for the nation	100	100	100	100	100	100	100	100	100	100	100	100
Industry	110	110	103	111	118	108	104	112	110	111	115	121
Agriculture	82	92	95	84	66	61	50	50	48	46	45	41
Construction	121	124	124	127	134	133	129	126	122	128	127	118
Transport	124	120	115	120	146	151	150	156	144	141	144	151
Communications	89	85	85	91	91	107	123	124	130	143	140	138
Healthcare	77	71	67	76	66	76	76	74	77	70	69	64
Education	80	78	67	71	61	68	69	65	70	65	63	58
Culture and arts	71	65	62	67	52	62	62	61	65	62	62	56
Sciences and scientific services	*102*	*102*	*113*	*90*	*64*	*68*	*78*	*77*	*83*	*94*	*99*	*110*
Finance, lending, insurance	99	96	135	180	204	243	208	163	193	177	199	231
Administration	97	90	120	99	94	115	117	107	120	131	129	123

The data provided in Tables 3.2, 3.3 and 3.4 point to the following.

1) The number of personnel involved in R&D was in effect halved in the 90-s. All those who were willing to and could quit the R&D sector did so. The main apparent reason for the drain was low wages in the sector.

2) A certain growth of employment figures in the sector was registered in 1998-1999. With the data available it does not seem practicable to provide an exhaustive explanation of why this happened, and it may become a target for a more detailed study. Nevertheless it may be assumed that at least the following factors were responsible therefor:

- relative wage growth vs. other sectors of the economy;
- reduction and settlement of wage arrears in government-owned research institutions;

- a dramatic reduction of high-status job opportunities for former research workers in business and banking sectors in the aftermath of 1998 crisis;

- increased role of status characteristics (scientific degree, prior experience in high-profile budgetary institutions, etc.) in the labor market and for career prospects, especially in the public sector;

- competitive advantage of research over other workmen seeking job opportunities abroad.

3) Slowly diminishing share of researchers and technical staff in the total number of employees was the main trend of the past decade. At the same time the share of support staff remained fairly stable against a steadily growing share of "other" employees that primarily include administrative and management staff.

4) The share of candidates and doctors of sciences involved in R&D displays a steady growth trend. It may be interpreted as improvement of quality of R&D staffing. However, additional studies will be required to provide an exhaustive explanation of this phenomenon. Striving of doctors and candidates of sciences to retain their jobs in scientific institutions may be an obvious drive of this upward trend. In addition, the drain of employees from the R&D sector resulted in improved career prospects for young scientists due to lower competition for scientific degrees.

5) Until 1998 the R&D labor force displayed an aging trend. Apparently, it may be explained by low wages reducing sector appeal to young people both in terms of income and career expectations. The situation might have reversed in the wake of 1998 crisis; however, there is no sufficient data to draw a definitive conclusion on that score.

3.4. Level of R&D costs in Russian economy

Internal costs – costs of R&D performed internally by institutions excluding costs of outsourced R&D - is used as a principal indicator of R&SD costs in Russian economy. Table 3.5 illustrates indicator performance over the previous decade.

Table 3.5. In-house R&D costs in Russian economy

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
In actually effective prices (RUR MM; RUR'000 from 1998 and onwards)	13 077	19 991	140 590	1 317 199	5 146 102	12 149 458	19 393 891	24 449 691	25 082 065	48 050 525
In constant prices 1989 г.	10 898	7 290	3 224	3 055	2 929	2 445	2 788	3 043	2 843	3 336
As a % of 1990	100	66,9	29,6	28,0	26,9	22,4	25,6	27,9	26,1	30,6
As a % of 1995	-	-	-	-	-	100	113,9	124,1	115,9	136,4
As a % of GDP	2,03	1,43	0,74	0,77	0,84	0,79	0,90	0,99	0,93	1,06

Some of the conclusions that can be drawn from the above Table are as follows:

1) There was a significant, about 3 times, real-term reduction of R&D costs over the last decade. Importantly, the greatest reduction occurred in 1990-1992, when Russia lived through its most dramatic financial and fiscal changes and radical transformation of the national economy.

2) R&D real-term spending curve continued on a downward trend well beyond 1992 until 1995. Thereafter it started to grow steadily, although slowly. This pick-up may be indicative of a certain degree of adaptation of the sciences sector to new economic environment and to partial replacement of government financing by other sources.

3) The growth trend becomes even more pronounced if one looks at R&D spending to GDP ratio that had been on the rise almost continuously since 1992; by 1999 it increased by 0.32 percentage points. Therefore, on average R&D expenditures were falling at a lower and growing at a higher rate than overall economic activities in the country.

3.5. R&D funding sources in Russian economy

Table 3.6 provides a breakdown of in-house R&D spending by source of funds

Table 3.6. In-house R&D spending structure by source of funds (%)

	1996	*1997*	*1998*	*1999*
Total	**100**	**100**	**100**	**100**
Budgetary funds	60,7	59,6	52,2	49,9
Business sector funds	15,3	15,5	17,3	15,7
Funding by private non-profit organizations	0,5	0,8	0,9	0,04
Cash-flow of science institutions	11,5	10,5	13,7	10,4
Extra-budgetary funds	6,2	6,0	5,5	6,9
Funds of higher educational institutions	0,1	0,1	0,1	0,2
Funds from overseas sources	5,6	7,4	10,3	16,9

An analysis of data in Table 3.6 points to the following steady trends.

1) *Shrinking share of budgetary financing.* The share of government in financing of the science sector is diminishing. However, the government still foots nearly half of the total bill for R&D costs, which is still higher by a considerable margin than in the majority of developed countries, where extra-budgetary sources account for up to 78 percent of total in-house R&D spending, with the business sector leading the way (See also Box 3.2).

2) *Increasing share of funding from overseas sources.* Given the trend for growth of R&D spending in real terms over the period in question, we may conclude that foreign investors and consumers display an ever-growing demand for Russian science products.

Such turn of events appears to be a serious concern for some groups of the ruling elite, especially those intertwined with the military and law enforcement agencies. They are afraid of that brain drain, industrial espionage and proliferation of foreign technologies might lead to Russia's loss of priority in some defense technologies. Their concerns may give rise to attempts to restrict international activities of Russian research institutions.

3) *A steadily low share of businesses.* It even decreased over a longer period of time (from 19.9 percent in 1994 to 15.7 percent in 1999). Although main reasons behind the private sector reluctance to finance science lie outside the R&D sector, the issue of whether the state ousts private investments from the science sector remains open. One of the likely reasons may be low efficiency of indirect incentives for non-government investments in the science sector.

Box 3.2. The share of government financing in total funding of science in foreign countries

As per OECD data in 1998 governments accounted for an average of 34.5% in financing of the science sector (39.1% for EC countries)

The share of government budget appropriations in total in-house R&D costs in some OECD countries in 1999 (translated into USD at purchasing power parity)

Country	*Share (%)*	*Country*	*Share (%)*
Russia	50	Canada	21
Australia	37	Poland	58
UK	37	USA	30
Germany	36	France	45
Spain	76	Japan	23
Italy	54		

Developed industrialized nations display a trend for lower budgetary financing of science. This trend was most pronounced in 1985-95 when many countries cut on their R&D spending for defense projects. On average, in OECD countries the budgetary spending on science shrank from 0.9% to 0.65% of GDP. Concurrently with reduction of budgetary expenditures on science, developed countries took important measures to review government policies in the sciences sphere. While retaining the function of supporter of fundamental and key applied research efforts, governments of these countries focused on providing incentives for innovation activities of the private sector and on enhancing commercialization of research findings.

Sources: Information bulletin. Analytical Center for Scientific and Industrial Policies, N8, 1999; Russian Science in Figures, CISN of the Ministry of Industry and Science of the Russian Federation, Moscow, 2000.

4) *Gradual increase of the role of extra-budgetary funds.* The system of R&D extra-budgetary funds that has been in the making since 1992 is especially important in terms of its potential for government regulation in the R&D sector. To a certain extent, those funds may be viewed as a tool for redistribution of resources by the government, since proceeds of the funds are generated through reduction of the taxable base of enterprises and organizations. However, this redistribution is achieved not through direct governmental interventions (withdrawal of a portion of profits in the form of taxes with a view to further redistribution), but through more flexible and more market-oriented methods that represent something in between direct and indirect methods of governmental intervention. By granting tax benefits, the government encourages enterprises to invest in R&D, however, the government retains the function of selecting R&D areas subject to government financing rather than allowing companies to do so.

Today there are nearly 100 sectoral and inter-sectoral extra-budgetary funds operating in Russia under ministries, departments, and industrial associations. The funds get registered with the Ministry of Industry and Science and are the backbone of

the system. Proceeds of the funds are accumulated on a voluntarily and contractual basis, while appropriation is through bidding. Pooling of enterprises' cash into extra-budgetary funds established by concerns and ministries provides the most important and virtually the sole source of financing for applied sciences today. A portion of proceeds of extra-budgetary funds is accumulated in the Russian Fund for Technological Development under the Ministry of Industry, Science, and Technologies of the Russian Federation. In 2000 RFTD financed over 100 projects for the total amount of RUR400MM+. However, the role of extra-budgetary funds in support of science is determined not only by the amount of allocated resources, but also by the use of modern financing forms and tools (expert examination of projects, bidding, business-planning, etc.). Project financing on repayment (partial repayment) basis is an important achievement of the funds and a proof of that it can well be implemented in the R&D sector.

However, approval in June 2001 of Article 25 of the Tax Code abolishing all exemptions from profits tax is likely to result in reduction and even in winding-up of activities of R&D extra-budgetary funds, if R&D spending ceases to be a deductible item[3]. Since there is no compensating tool in the pipeline to provide for indirect incentives for non-government investments in R&D, we may expect to see some reduction of R&D spending in the near term, as well as some political activity aiming to increase budgetary expenditures on science.

3.6. Conclusions and Recommendations

Inaccurate, incomplete and incompatible terms used in government statistics and government regulation of the R&D sector of the Russian economy obscure the true picture of the sector and hamper reasonable political and managerial decision-making. Nevertheless, the available data, although inadequate, allow the following conclusions to be drawn.

The early 1990s saw a drastic loss of momentum in the scientific sector in response to the general economic crisis as well as the incipient system transformation process. An initial sharp fall in quantitative characteristics (such as the number of organizations doing R&D, the number of employees, and level of financing) was followed in the mid-nineties by what could be called stabilization that later gave way to a poorly pronounced up-trend. However, it has been evolving amidst substantial changes of the sector structure and bears witness to that the scientific sector has somehow adapted itself to a new economic reality.

Recent positive trends include:

- higher absolute and relative levels of R&D funding;
- lower share of direct R&D financing by the government;
- higher level of salaries in the R&D sector versus other economic sectors;
- increased number of R&D staff with academic degrees.

However, disturbing tendencies, such as:

- unabated growth in the number of state-owned (public) research institutions amidst hard constraints imposed on levels of budgetary resources;
- a high share of government financing in the total R&D funding;

[3] The Second Part of the Tax Code (insofar as it concerns the enterprise profits tax) passed the third reading in the State Duma of Russia on 22 June 2001. The text approved by the Duma has retained tax incentives for R&D spending, i.e. these expenditures will continue to be deductible items

- an invariably low-key participation of the private business sector in R&D funding;
- aging of the personnel engaged in research; and
- a decrease of the share of researchers against an increase of the share of managerial personnel;

are also seen in the R&D sector.

Recommendations

(i) make an inventory of terms and definitions pertaining to government regulation of the R&D sector and used in regulatory acts and public administration and eliminate most obvious contradictions; in the longer run develop a uniform terminology in the area of state regulation of the R&D sector; bring regulatory acts and public administration procedures in conformity therewith;

(i) reform the system of public institutions to bring about a reduction in their numbers through voluntary movement of some of them to a non-public sector; reform the practice of accounting for extra-budgetary revenues of public institutions (for accounting of extra-budgetary revenues see Fiscal Policy Center Report);

(ii) develop a system of measures for indirect encouragement of the private (entrepreneurial and non-profit) sector to increase R&D financing;

(ii) Step up efforts for lowering the existing barriers and prevention of new ones from blocking the way for foreign customers, investors and sponsors willing to finance R&D in Russia.

4. Government Financing of R&D in Russia

4.1. R&D spending in functional budgetary classification

It is impossible to determine the size of budgetary spending on defense-purpose R&D under the existing functional budgetary classification, since these expenditures are included into closed sections of the state budget (section 04 “National Defense”). Elsewhere in this report, unless expressly stated otherwise, we’ll consider only commercial-purpose R&D.

Section 06 “Fundamental Research and Promotion of Scientific and Technological Progress” takes care of the bulk of budgetary spending on civil science. This section includes two sub-sections: 0601 “Fundamental Research and Promotion of Scientific and Technological Progress” and 0602 “Development of Advanced Technologies and Priority Areas of Scientific and Technological Progress”. The sub-sections are designed to reflect costs of fundamental and applied studies, respectively. The section structure is represented on Chart 1.

Section 06 largely covers revenue expenditure on R&D and capital expenditure on acquisition and upgrading of equipment, maintenance repairs, etc. Moneys for construction of research facilities and overhauls are accounted for under section 07 “Industry, Utilities,

and Construction" in the Federal Target Investment Program and in the non-program portion.

Besides, some of public expenditures on science, including civil science, have been included since 1998 in section 24 "Exploration and Use of Outer Space", sub-section 2402 "R&D in Outer Space Activities". Before those expenditures fell within the scope of other sections: in 1993 Budget the Federal Space Program was shown separately in section "Financing of Fundamental Research and State Scientific and Technological Programs of the Russian Federation". In 1994 the Russian Space Agency was financed under a separate item in section "State Support of Sectors of National Economy". In 1996 the moneys were earmarked under sub-section 0601.

The way public expenditures on science are reflected in the budget classification of the Russian Federation is distinguished for that the existing budget classification is at variance with the taxonomy of terms and definitions used in the Law of the Russian Federation "On Science and Government Scientific Policy" (#137-FZ, dated 23 August 1996). Part of expenditures on what is defined therein as "scientific research", "scientific and technological activities", or "experimental activities" are run not through Section 06, but through other sections of the budget classification (for example, expenditure type 408 "Geological Studies of Subsoil of the Russian Federation, Continental Shelf and the Global Ocean for Federal Needs" is included in sub-section 3107 "Federal Fund for Replacement of the Mineral Resource Base"; 0904 "Hydrometeorology" and 0905 "Cartography and Geodesy" are given as separate items, etc.).

In view of the above it is next to impossible to determine the exact share of public spending even on civil science in total budgetary expenditures. However, expenditures classified under Section 06 "Fundamental Research and Promotion of Scientific and Technological Progress" of the federal budget reflect a significant portion of, if not the total spending, on science. Besides, the amount of public spending on civil science may be clarified by using Goskomstat data calculated in accordance with standard international methodologies.

4.2. Federal budget expenditures on R&D

Table 4.1 reports sums total of federal budget expenditures on R&D.

Historic performance of those indicators is generally in line with historic performance of total spending on R&D from all sources (See Section 3.4). Notably, the local maximum of government financing reached in 1997 (in constant prices), despite increased allocations, was not surpassed in 1999 and is unlikely to be exceeded in 2000-2001. At the same time, the total amount of resources channeled to the R&D sector from all sources in 1999 already exceeded 1997 figure (See Table 3.5). It points to a diminished role of the government budget in financing of science and to on-going adaptation of the science sector to new economic conditions.

Table 4.1. R&D funding from the federal budget (RUR in billions; after 1998 – RUR in millions)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000**
Allocations for science*										
- in actually effective prices	25,84	177,9	1560,6	4034,2	8940,6	11170,3	18009,8	10479,4	23940,8	-
- in 1991 constant prices.	25,84	11,19	9,93	6,30	4,94	4,40	6,15	3,26	4,56	-
As a percentage of:										
- gross domestic product		0,94	0,91	0,66	0,58	0,52	0,71	0,39	0,53	-
- federal budget expenditures		4,52	5,72	2,83	3,25	3,14	4,13	2,69	3,59	-
Allocations for civil science***										
- in actually effective prices	13,44	103,2	848,9	2791,5	5473,0	7206,2	10777,5	7439,4	14364,5	18639,1
- in 1991 constant prices	13,44	6,49	5,40	4,36	3,02	2,84	3,68	2,31	2,74	2,64

As a percentage of:										
- gross domestic product		0,54	0,49	0,46	0,36	0,34	0,43	0,28	0,32	0,29
- federal budgetary expenditures		2,62	3,11	1,96	1,99	1,80	2,47	1,58	2,15	2,18
Allocations under section "Fundamental Research and Promotion of Scientific and Technological Progress"										
- in actually effective prices	13,44	95,3	700,0	2366,3	4413,6	5699,6	8808,7	6239,4	11621,5	15926,7
- in 1991 constant prices	13,44	5,99	4,45	3,69	2,44	2,25	3,01	1,94	2,21	2,25
As a percentage of:										
- gross domestic product		0,50	0,41	0,39	0,29	0,27	0,36	0,23	0,26	0,25
- federal budget expenditures		2,43	2,56	1,66	1,60	1,60	2,02	1,32	1,74	1,86

** - as estimated by the CISN of the Ministry of Industry and Science of the Russian Federation;*

*** - target;*

*** including aerospace R&D.

4.3. Break-down of federal budget expenditures on R&D by function and purpose of spending

As can be seen from Chart 1, level three (earmarked items) and level four (types of expenditures) in Section 06 of the functional budget classification are for the most part determined by a system of departments that have traditionally been responsible for the R&D sector (academies having the status of state academies, public budgetary funds, etc.). As a matter of fact, the functional classification at the level in question correlates, if not coincides, with and is even driven by, the departmental one. On the other hand, "non-departmental" earmarked items and types of expenditures are generally either overly aggregated (as in case of expenditures of 187 type "R&D under Federal Target Programs" and 216 "Other R&D") or too narrow (as in the case of 273 "Upkeep of Highly Valuable Sites of Cultural Heritage of Peoples of the Russian Federation").

Thus, the existing budget classification virtually precludes planning and control of expenditures both from R&D regulation purposes and objectives' perspective and from the standpoint of scientific and technological policy priorities as set by the government. Budgetary planning and state expenditures appear to be largely aimed to support the existing structure of agencies and organizations.

The way the budget classification is structured is a major hurdle on the way to transition from infrastructure principle to target principle of funding of scientific institutions.

A review of allocation of budgetary expenditures on science by function does not allow to clearly track precise targets of such allocations – no special targets (economic, social or other) are identified under its items (except for the development of science as such, and research related to outer space and defense). This may be illustrated by expenditures projected under the Federal Law "On 2001 Federal Budget", Exhibit 9. Table 4.2 provides relevant data aggregated for several earmarked items.

Fragmentary data on earmarked federal budget expenditures on sciences is contained only in Appendices to the budget law, target programs and departmental documents. Some data may also be found in state statistics (See, for example, Table 4.3 and Box 4.1). However, they are not enough to give a full and undistorted picture, required for efficient organization of the budgetary process.

Table 4.2. Break-down of 2001 budgetary spending under section 06 "Fundamental Research and Promotion of Scientific and Technological Progress" by sub-sections, earmarked items and expenditure types of functional classification

Description	Section	Sub-section	Earmarked item	Expenditure Type	**Amount (RUR'000)**	**Share of the total for Section 06 (%)**
"FUNDAMENTAL RESEARCH AND PROMOTION OF SCIENTIFIC AND TECHNOLOGICAL PROGRESS"	**06**				**22 093 972,1**	**100**
Fundamental research	06	01			10 716 269,3	48,5
Conducting of fundamental research	06	01	270		7 674 899,9	34,7
Fund for awards of individual support of leading scientists and scientific schools	06	01	270	180	159 780,0	0,7
R&D under federal target programs	06	01	270	187	5 000,0	0,02
Other R&D	06	01	270	216	7 246 927,7	32,8
Upkeep of highly valuable sites of cultural heritage of peoples of the Russian Federation	06	01	270	273	263 192,2	1,2
State support of academies having the status of state academies	06	01	271, 272, 273, 274, 275, 276, 278, 279, 280		1 501 791,4	6,8
RFFI Expenditures	06	01	286		1319638,3	6,0
RGNF Expenditures	06	01	287		219939,7	1,0
Development of advanced technologies and priority areas of scientific and technological progress	06	02			11377702,8	51,5
R&D					11147763,1	50,5
Building IT communication networks and data bases of fundamental science and education	06	02	281	181	415000,0	1,9
Financing of priority areas of science and technology	06	02	281	182	1957542,8	8,9
R&D under federal target programs	06	02	281	187	4975748,0	22,5
Other R&D	06	02	281	216	3769472,3	17,1
Upkeep of highly valuable sites of cultural heritage of peoples of the Russian Federation	06	02	281	273	30000,0	0,1
Expenditures of the Fund for Support of Small Businesses in Science and Technology Sector	06	02	288		229939,7	1,0

Table 4.3. Allocations under section "Fundamental Research and Promotion of Scientific and Technological Progress" of the federal budget broken down by area (%)*

	1992	1993	1994	1995	1996	1997	1998	1999	2000***
TOTAL	100	100	100	100	100	100	100	100	100
*Ministries and departments***	*77,0*	*80,0*	*79,2*	*75,2*	*75,1*	*73,8*	*69,2*	*69,7*	*70,49*
including federal target programs	-	-	13,6	18,0	16,0	20,47	16,49	20,6	18,4
Earmarked budgetary funds	-	*2,6*	*5,0*	*5,5*	*4,7*	*5,2*	*7,1*	*8,0*	*8,0*
Russian Fund for Fundamental Research	-	2,6	4,3	4,45	3,0	3,3	5,1	6,0	6,0
Russian Humanitarian Sciences Fund	-	-	0,2	0,5	0,8	1,0	1,1	1,0	1,0
Fund for Support of Small Businesses in Science and Technology Sector	-	-	0,46	0,5	0,9	1,0	0,9	1,0	1,0
Priority areas of development of science and technology	*23,0*	*17,46*	*15,8*	*19,3*	*20,2*	*20,9*	*23,7*	*22,4*	*21,5*
Federal target scientific and technological program "Research and development in priority areas of civil science and technologies"	7,9	11,6	11,3	14,1	17,2	15,2	17,2	11,1	10,7
Program for development of government scientific centers	-	8,3	8,5	10,4	15,1	10,6	13,7	6,9	5,9
State scientific and technological programs	7,9	3,3	2,7	3,7	2,1	4,6	3,5	4,3	4,8
Total for other priorities	15,0	5,9	4,5	5,2	3,0	5,8	6,5	11,2	10,8
Regional centers and programs	-	0,6	0,3	0,3	0,2	0,1	0,1	0,1	0,1
International projects and programs	1,1	0,9	0,9	0,9	0,4	0,5	0,4	0,6	0,5
Top national economy programs and projects	9,0	2,6	1,2	1,0	0,8	0,6	1,0	0,8	0,8
Program for development of science innovations infrastructure	-	0,2	0,07	0,1	0,048	0,2	0,1	0,2	0,2
Maintenance of unique rigs and installations	-	-	0,8	0,9	0,3	0,49	0,4	0,5	0,6
Fund for awards of individual support to leading scientists and scientific schools	-	-	-	0,5	0,1	0,46	1,0	1,0	0,9
Building IT communication networks and data bases of fundamental science and education	-	-	-	0,45	0,2	0,46	0,6	1,2	1,2
New-generation vaccines and future medical diagnostics centers	-	-	-	-	-	0,4	0,3	0,7	0,6
Program for creation of large collider	-	-	-	-	-	0,2	0,2	0,2	0,3
Other federal target programs	-	-	-	-	-	0,2	0,1	0,6	0,6
Other	4,9	1,5	1,3	1,46	0,9	2,2	2,3	5,3	4,9

* Calculate pursuant to *Russia's Science in Figures,* 2000. Moscow, CISN, 2000.
** Including state academies of sciences.
*** Plan.

Box 4.1. Budgetary allocations for science by purpose of spending

A detailed review of R&D budget based on the classification by purpose of spending generally accepted by world statistics yields the following distribution of allocations by social and economic purposes: 1 – defense (30-40 percent); 2 – economic development (28-35 percent); 3 – development of science (9-15 percent); 4 – Healthcare and other social functions – (10-12 percent).

The structure of total (budgetary and non-budgetary) spending features different proportions. Defense studies occupy a prominent, but not leading, place. The share of defense R&D in 1998 amounted to 23%, which is above the similar indicator in other countries (USA – about 17 percent, UK and France – about 14 percent). R&D efforts aiming to meet the needs of various economy sectors and of science itself are at the top of the list, amounting to 39 percent and 27 percent, respectively. Spending on social purposes is at about 4% level and is steadily decreasing.

Source:1994-1998 estimates of the Ministry for Industry and Science

4.4. Federal budget spending on R&D by ministries and departments.

The principal managers of budgetary resources under section 06 are:

1) Ministry of Science and Technologies.
2) Academies of science having the status of state academies:
- Russian Academy of Sciences – RAN;
- Russian Academy of Medical Sciences – RAMN;
- Russian Academy of Agricultural Sciences– RASHN;
- Russian Academy of Architecture and Construction Sciences– RAACS;

- Russian Academy of Education –RAO;
- Russian Academy of Arts – RAH;

3) Moscow State University;

4) Budgetary funds for support of sciences:

- Russian Fund for Fundamental Research - RFFI;
- Russian Humanitarian Sciences Fund – RGNF;
- Fund for Support of Small Businesses in Science and Technology Sector – FSSB;

5) Ministries and departments.

Table 4.4 provides aggregated data on amounts and proportionate shares of funding distributed through various principal managers.

Table 4.4. Break-down of federal budgetary spending under section 06 "Fundamental Research and Promotion of Scientific and Technological Progress" by principal managers of budgetary resources*

Description	*1999 (actual)*		*2001 (plan)*	
	RURMM	*%*	*RURMM*	*%*
Total for the Section	**11634.5**	**100**	**22093.9**	**100**
State academies of sciences, Moscow State University	4237,0	36,4	9010,0	40,0
Public budgetary funds	930,7	8,0	1776,2	8,0
Ministry of Science (Ministry for Industry and Science) of the Russian Federation	2683,3	23,1	5450,7	24,7
Ministries and departments	3783,5	32,7	5857,0	26,5

* as estimated by the RF Ministry for Industry and Science

Ministries and departments distribute a significant portion of received funds through target programs. In addition, they pursue their own sectoral and inter-sectoral target programs. Lack of relevant data precludes any assessment of targets, scale and efficiency of such activities.

To the contrary, the Ministry of Industry and Science distributes most of budgetary resources (nearly 25% of total financing under Section 06) between earmarked items that have to do with priority areas of scientific and technological programs (STP). The Ministry is responsible for direct financing of providers under Federal target scientific and technological program "Research and development in priority areas of civil science and technologies" (sub-section 02, earmarked item 271, expenditure type 187). The federal program also includes programs of 58 public scientific centers (which account for nearly 50% of the program budget (2000)). Besides, the Ministry is responsible for finances the Fund for awards for individual support of leading scientific schools (about 3% of the moneys distributed by the Ministry; funding is effected jointly with RFFI), as well as priority areas of science and technology (about 37%). The Ministry is financing the Russian scientific center "Kurchatov Center", Joint Institute for Nuclear Research and a network of departmental scientific institutions.

RAN and its regional branches, sectoral academies having the status of state academies, and Moscow State University are the principal recipients of funds under sub-section 0601 "Fundamental research". They are responsible for distribution of budgetary resources to end-users. In this case academies of sciences actually act as agencies in that they distribute budgetary resources to subordinate institutes (782 organizations). The bulk of institutes of the academies carry out a full-scale research cycle (from fundamental research to reduction of obtained results to production

practice[3]) and receive additional financing within federal target programs under sub-section 0602. Although normally procedures for funding provided outside the scope of federal target programs also require that financing be aligned with government priorities and meet targeted-allocation principle, experts believe that these requirements are oftentimes of a purely formal nature.

The data contained in Table 4.4 suggest that funding of science by agencies occurs in a fairly haphazard way. Budgetary moneys are managed by numerous agencies, which use their in-house procedures and look after their own agenda.

4.5. Financing of R&D under federal target programs

4.5.1. Target-program-based methods of R&D funding

Distribution of resources using target-program-based methods allows implementing a selective approach to support of sciences and ensures development of priority areas of science and high technologies. Back in the USSR period a system of public scientific and technological programs had been set up in an attempt to re-orient the R&D budget from the infrastructure driven to the target driven resource allocation principle, and in so doing take into account government's concern for support of the final (innovation) stages of the science cycle. In early 90-s financing of science through federal target programs was declared one of the basic avenues of science and technology policies in Russia. However, any meaningful moves in that direction are very slow, and currently used forms of target-program approach do not always correspond to actual contents of evolving processes.

Thus in 2000 the R&D under 68 federal target programs were financed under sub-section 0602 "Development of Advanced Technologies and Priority Areas of Scientific and Technological Progress". Although the share of the R&D budget distributed via ministries and departments keeps growing it does not exceed 30% of total expenditures under section 06. In 1994-99 the share of spending on R&D under federal target programs in total section 06 expenditures increased from 13 to 21 percent, while the share of spending under federal target scientific and technological program "Research and Development in Priority Areas of Civil Science and Technologies" amounted for the same period to about 11 percent (15 percent in 1995 and 17 percent in 1996). Thus, there were years in that period when the share of programs in the R&D budget approached 35%. In 2000-01, following FTP revision the FTP share fell to 11%, with the share of federal target scientific and technological program "Research and Development in Priority Areas of Civil Science and Technologies" remaining at the same level.

Efficiency and effectiveness of financing just described is to a large extent driven by general FTP problems. Many experts regard federal target programs as an unruly form of government financing. During 90-s the number of those kept growing from 45 in 1995 to 144 in 2000 and to 135 in 2001. The current practice of FTP development led to a situation where resources required for their implementation exceed economic potential of the state. Consequently, the budget was invariably unable to discharge its funding obligations vis-à-vis target programs, which was

[3] In 1999 fundamental research in RAN accounted for 72 percent of current R&D spending, in RASHN – for 43 percent, and in RAMN - for 68 percent (as estimated from *Russia's Science in Figures* Moscow, CISN of the Ministry of Industry and Science of the Russian Federation, 2000). Refer also to Table. 2.3.

aggravated by extra-budgetary financing falling short of projected figures. Primarily it affected financing of scientific projects under those programs and delayed completion of projected works. Stocktaking and updating of the FTP list have so far failed to produce adequate results due to continuous exposure to political and economic lobbying.

Approval of the federal level list of priorities in science and technology and critical technologies in 1996 failed to produce any meaningful effect on existing practices of building scientific blocks of target programs, other than identification of priorities in science sections of the target programs which were already in the pipeline.

Due to the foregoing reasons, R&D efforts within the FTP scope appear to have a very loose connection with FTP purposes and objectives. There are scientific projects pursued under some of the federal programs that may not be very instrumental in reaching final FTP objectives.

At the same time it must be acknowledged that in recent years major efforts have been taken to improve both the FTP system and financing practices vis-à-vis FTP scientific blocks. Contracts on FTP projects are awarded through bidding procedures. FTP scientific blocks are developed as part of projects intended to create a specific product or technology. Providers have to bid for contracts. In 1999 government customers for R&D under target programs arranged over 1,000 tenders and concluded contracts on performance of works with the winning bidders.

During the next five–year cycle of programs (2002-2007) new approaches are supposed to be followed in generation and implementation of federal target programs. The Ministry of Science of the Russian Federation is undertaking related studies. Budgetary funds earmarked for implementation of scientific and industrial and innovation policies by target-program methods are intended to be focused on three comprehensive federal target programs: “Research and Development in Priority Areas of Science and Technology”, “National Technological Base” and “Improvement of Competitiveness of Domestic Producers of Goods” that are going to be put together along the same underlying principles.

The goal of the “Research and Development in Priority Areas of Science and Technology” program is to build up science and technology potential to be used in federal target programs intended to achieve specific social and economic goals and to effect industry re-equipment. “National Technological Base” FTP is structured like an interdepartmental integration program that outlines long-term prospects of Russia’s technological development, lays down a technological foundation for a new generation of high-tech products that will contribute to their export potential. The program consolidates efforts that were undertaken earlier under previously implemented federal target programs. “Improvement of Competitiveness of Domestic Producers” Program is designed to create financial and organizational environment, that would give a competitive edge to domestic producers in domestic and global markets by bringing to bear the innovation potential in the industry. The program will pool together what has been earlier accomplished under several former target programs.

As this happens, non-repayment financing by the federal government will become the principal form of support of explorations and R&D projects. The role of the government in innovation projects and technological development programs will be restricted to providing incentives for innovation activities of enterprises (financing initial stages of practical implementation of R&D results, equity participation of the budget in adaptation of design elements or technology to a specific production site, in

development of production process documentation, design support of products at transition from manufacturer's testing to batch production, etc.). Budgetary financing of final stages of innovation cycle should be extended only contingent on concurrent extra-budgetary sources of investments and help raise much bigger amounts from enterprises and non-government financial institutions.

Flexibility in identification of program measures emerges as a key principle of creation of new joint federal target programs. It means, *inter alia*, that when individual federal target programs are generated only the terms and conditions for allocation of budgetary funds for various projects under such programs are to be established. Specific targets for budgetary financing are selected based on multiple criteria assessment of projects (such as scientific, technical, economic, environmental and other criteria). This approach to federal target programs, if implemented, will allow creation of a mechanism for selection and budgetary financing of only those program measures that are expected to yield maximum result within the existing resource constraints.

4.5.2. Federal target scientific and technological program "Research and Development in Priority Areas of Civil Science and Technologies" (FTSTP)

As opposed to other federal programs incorporating R&D, FTSTP is called upon to be the main vehicle for achievement of national priorities in science and technology. Therefore, budgetary financing of the program may be viewed as a reflection of those priorities in the budget process.

Scope and formulation of FTSTP

FTSTP is commonly viewed as a relatively new tool for achievement of priority objectives in science and technology in Russia that had been introduced after official approval of the list of those priorities and critical technologies of federal level in 1996. To raise their importance, it was decided that efforts in the field of priorities and critical technologies should be undertaken under a single federal target program. With limitations imposed by the time available for its development and the need to ensure continuity with the formerly applied mechanisms of sectoral and inter-sectoral priority implementation through public scientific and technological programs the FTSTP had been formed by pooling together scientific and technological programs and tying them formally to officially established priorities. Thus, any FTSTP drawbacks and problems are a product of the above approach. At a later stage, a program for support of public scientific centers was added to the FTSTP.

The FTSTP scope by far exceeds scientific blocks of other federal target programs. The problem of under-funding of the program was for the first time overcome only in 1999, when the FTSTP received budgetary funds allocated to it in full and in due time.

Over half of FTSTP moneys (55 percent in 2000) are used to finance public scientific center (PSC) development program. The remaining funds are spent on sub-programs and projects, which correspond to eight priority areas of science and technology development and ensure achievement thereof.

Sub-programs *and projects implemented within the framework of priority development areas of science and technology*

The need for FTSTP improvement stemmed from the way the Program had been put together and called for a revision of priorities for science development and the list of critical technologies; revision of the list of sub-programs and projects for a

significant reduction of their number; coordination of sub-program activities; execution of sub-programs and projects on the basis of bidding and contract system, etc. A 2.2-times reduction of projects in 1998-99 allowed an increase in the average annual financing per project (to RUR1MM). By the year 2000 the number of projects was reduced four times resulting in the average cost per project increase to RUR2MM, i.e. to a level allowing handling of practical tasks. Thus, the FTSTP was brought more in line with priority areas of science and technology. Getting rid of low-priority projects or those that were not supported with sufficient resources permitted focusing FTSTP efforts and budgetary funds on those priority areas.

Concurrently, in 1999 some progress was scored in extra-budgetary financing of a number of FTSTP sub-programs at the expense of extra-budgetary funds, with extra-budgetary financing amounting to over 10 percent of the budgetary financing. Thus FTSTP provides incentives for development of the private sector in the R&D area and industrial innovation complexes around high-tech and primary sectors of the economy (such as "Fund for New Technologies and Innovation Machine-building", etc.).

Further FTSTP improvement is associated with the use of uniform program generation and program implementation principles, as proposed by the Ministry of Industry and Science, in preparation of programs for 2002-2007. The new FTSTP purpose should be to build a science and technology potential for other federal target programs. Its primary objective should be to concentrate resources on research in areas constituting a priority for the government (social and economic development, structural transformation and sustained development of the economy, national security, etc.). Major program measures such as exploratory research called upon to provide the basis for applied R&D targeted at development and testing of new product, materials and equipment samples are supposed to be financed from federal budget funds on a non-repayment basis. The expected economic effect of exploratory research and applied research projects, given the projected amounts of budgetary resources, should serve as a criterion for inclusion of any such research or project into the FTSTP.

Efficiency of federal budget spending on FTSTP in 2002-07 will to a significant extent depend on complete and consistent reflection of new principles of formulation and implementation of specific programs in the integrating program in question.

Program of public scientific centers (PSC) development

PSC program has become one of the first steps in realization of the selectivity principle in contemporary Russian science policy. The purpose of the program that effectively has been implemented since 1992 is to preserve and develop the better part of various branches of domestic science. Implementation of the program succeeded not only in preventing the leading scientific institutions of the country from degradation but also in maintaining high standards of R&D including fundamental research conducted there.

In different years the PSC network included from 56 to 61 organizations. Initially PSC program was financed separately as an earmarked expenditure item of the Ministry of Science. Later on it was incorporated into the FTSTP as a sub-program. The reason behind those changes is that the range of PSC research topics essentially covers the entire spectrum of priority areas of development of science, technology, including critical technologies.

The government's obligations vis-à-vis PSCs consist primarily in providing budgetary funding for their plans of fundamentals and applied research. Departmental

PSC funding is supplemented with program-based financing. Program funds are used to finance PSC work plans that have cleared government examination and selection procedure. The amount of funding for each PSC is determined by matching requests against the amount of funds allocated for the program. Forms of submitting PSC plans and programs, mechanisms of expert review and selection of projects and evaluation of results as well as procedures for trade-off between requests and program capacity, etc. are to be continuously improved.

Financing of PSC as well as science in general fell short of the targets and the time schedule for disbursement of funds. High levels of budget execution achieved occasionally failed to reflect the real situation, since they resulted from tax exemptions, system of offsets and other non-monetary forms of budget execution. Significant variation of absolute and relative sizes of funding caused by continuous revision of priorities emerged as an additional feature of PSC program funding.

The fact that PSCs received funds simultaneously through respective ministries and PSC program served as the strongest argument for criticism leveled at the program. Still more important is the fact the history of departmental PSC financing reflects industry-level priorities of research conducted thereby, while the history of financing under the PSC program reflects national priorities in science and technology.

It is now obvious that PSC legal and regulatory framework needs to be updated with a view to bringing it in conformity with applicable laws. However, full completion of the PSC program seems to be hardly relevant, since now it is one of a few means of realization of national priorities in science, technology and federal level critical technologies. In the future the issue of PSC functioning and financing should be considered within the context of overall reform of public institutions.

4.6. Federal budgetary funds for support of science

Budgetary funds for sciences (Russian Fund for Fundamental Research, Russian Humanitarian Sciences Fund, Fund for Support of Small Businesses in Science and Technology Sector [4]) are presented as separate items under section 06 of the functional classification of budgetary expenditures. For Russia those funds are fairly new recipients of budgetary resources. They were established in 1993 pursuant to the Presidential Decree “On Urgent Measures for Preservation of Scientific and Technical Potential of the Russian Federation” and to 1995-96 regulations of the Russian Government. Their emergence is associated with realization in early 90-s of key principles of reform in Russian sciences - financing in the form of earmarked grants awarded through bidding procedures subject to independent expert assessment of bids.

Three Funds - RFFI, RGNF and FSSB – accumulate virtually all resources allocated to budgetary funds and represent public self-governing institutions reporting to no agencies whatsoever and providing support to scientific research and researchers teams. The amount of resources distributed through each of those Funds is set as a percentage of the total amount of federal budget financing for civil sciences. Joint financing of individual projects and programs by those Funds (RFFI and FSSB provide an example of such consolidation of efforts) facilitates translation of results of

[4] There are two more funds: Fund for Awards of Individual Support to Leading Scientific Schools and Fund for Civil Research have not yet been institutionalized. The Ministry of Industry and Science is responsible for management of their resources.

fundamental research in the real sector of the economy and selection and performance of works that have already generated demand for their results.

That allocation of budgetary resources through Funds is an efficient way of distribution is a generally recognized fact. Even in Russia where their history runs to just a few years and where budget resources are limited, norms of formation of Funds' resources have already been raised (4 times for RFFI bringing it to 6 percent, and up from 1 to 1.5 percent for FSSB). However, the combined amount of support of sciences through those Funds in Russia is yet rather small and is below their potential. In 2000 only about 9 percent of section 06 moneys was distributed through the above mentioned funds.

Funds for support of fundamental science

Inclusion of RFFI and RGNF as direct recipients of budgetary funds into sub-section "Fundamental Research" underpins orientation of the two towards fundamental sciences in the context of budgetary financing. Creation of those Funds became one of the most efficient steps made by the government in terms of preservation and development of fundamental science and the most important (and the only apparent one) result of reforming R&D sector. RFFI provides financing for research projects, supports development of information and communication capacities of domestic sciences (by funding expeditions, foreign trips by scientists, sponsorship of scientific conferences arranged in Russia, support of scientific libraries and book printing, etc.) preservation of material and technical base for fundamental research. RGNF takes care of similar issues in humanitarian sciences. Currently RFFI and RGNF span all principal topics of fundamental sciences. Results of research undertaken on account of those funds are public property and are widely used in various sectors of science and economy.

Some experts are of the opinion that RFFI and RGNF by now have accumulated some experience in *awarding earmarked financing through bidding procedures* for projects in fundamental research area and have developed procedures for expert review and selection of such projects. They demonstrate feasibility and efficiency of financing fundamental sciences at the government expense, as well as of identification and provision of support to the more active and productive groups of scientific community at the national level.

A strong disadvantage of the current practice of funding through RFFI and RGNF is that the Funds are narrowly constrained by RAN decisions that comes through, inter alia, in the selection of experts, existence of informal criteria for decision-making in key areas of the Funds' activities, etc. Overcoming this dependence is a strategic improvement objective for the Funds.

We assume that now is the right time for gradual re-allocation of moneys under sub-section "Fundamental Research" between academies and the Funds in favor of the latter. Relevant measures may be taken already during approval of 2002 budget. Progress in this direction will not only improve efficiency of budgetary financing of fundamental research, but will also accelerate actual reforming of the science sector controlled by Russian academies.

Fund for Support of Small Businesses in Science and Technology Sector

The main purpose of the FSSB is to support small businesses that produce goods and services on the basis of intellectual property in their ownership. The support is provided under the following programs:

- funding projects of small businesses in research and development area;
- creation of a network of innovation and technology centers;

- support of training, consulting and technology transfer infrastructure;
- funding exploratory research;
- organization of exhibitions and fairs;
- advertising of goods and services.

The purposes and objectives of the Fund prompted its incorporation into subsection 0602. The Fund is in effect the sole principal recipient of budgetary funds, which is directly oriented at commercialization of R&D results and provides for development of small high-tech businesses and transfer of technologies to various industries.

The principal difference between FSSB and other Funds is that its moneys may be extended on principal + interest-repayment basis. In addition to selection of funding terms and conditions on the case-by-case basis (interest rate, etc.) the fund may act as a pledger or guarantor under obligations of corporate and natural persons. Thanks to that the Fund is able to increase its assets through repayment proceeds (partial repayment), fees for expert examination of projects and interest.

The Fund's experience points to feasibility and efficiency of using budgetary funds in scientific and technological sector on the principal + interest-repayment terms. Using a portion of the R&D budget on such terms and conditions now appears to be the most important resource for improvement of efficiency of budgetary financing in the sector. This will require to clearly define criteria for application of principal + interest-repayment practices in the R&D budget and agree on departmental approaches thereto.

4.7. Federal budget expenditures on R&D according to the object of spending

An analysis of R&D cost components as per R&D statistical data indicates that in the 90-s revenue expenditure amounted to 96-97%, while capital expenditure amounted to 3-4%. Certain shifts became apparent in the internal cost structure. The share of equipment in capital expenditure increased from 27% in 1994 to 45% in 1999, while the share of buildings and structures fell from 49% to 9%. Costs relating to acquisition of equipment varied in 3.5-4,5% range, with monetary costs increased from 16% to 26% (table. 1.5.).

An analysis of revenue and capital components of budgetary costs under section 06 yields a similar proportion, although capital expenditures account for a slightly larger figure (5.8% in 2001 budget).

The structure of *revenue expenditure* varies significantly across sub-sections of functional section 06. Under sub-section 0601 (fundamental research, priority financing of academic institutes, funds for support of fundamental research) wages account for over 40% of current expenditures (nearly 44% in 2001 budget). About 11% is spent on public utilities, 20% - on subsidies and subventions, with less than 1% devoted to payment for services of scientific and research institutions.

The situation is altogether different with sub-section 0602 (applied R&D, distribution of funds under federal target programs, basic financing of subordinate organizations: institutions and unitary enterprises): wages account for 9% of current expenditures, public utilities – for about 1.2%, subsidies and subventions - 15%, fees for services of research institutions - 68%.

The data just described again emphasizes the existing differences in financing principles that are used in distribution of resources under sub-sections 0601 and 0602. In the former case, the moneys are primarily used to support organizations, while in

the latter case the moneys are used to finance target programs and to support organizations.

In the aggregated form the analysis of distribution of budgetary resources between current and capital expenditures by object of spending does not allow one to see how the process actually takes place (structure-wise and dynamics-wise) at a specific organization level and how in affects activities of a specific organization. Not only official statistics data (relevant tables of 2-n forms of Goskomstat for organizations receiving financing from the budget) but also surveys of organizations and interviews of their senior managers may provide a tool for analysis of existing problems at the organization level.

An assessment of total amount of *capital expenditures* in science presents certain challenges since these expenditures are classified under different budget sections. A significant portion of capital expenditures in section 06 is run through sub-section 0601 (with current to capital expenditure ratio under this section being equal to 12:1, while for sub-section 0602 this ratio is 22:1). The reason for this may be as follows. Capital expenditures under sub-section 0601 are for the most part used for acquisition and upgrading of equipment and maintenance repairs (i.e. under the budgets of specific organizations that receive budgetary funds). Besides, academies of sciences and the Moscow State University receive funds for maintenance and repairs of apartment housing and implement certain programs aiming to support their own research base. A number of programs of the Ministry of Industry and Science, acquisition and upgrading of equipment of subordinate institutions (to a lesser extent than under sub-section 0601) are financed under sub-section 0602 insofar as it concerns the support of technical base.

Construction of scientific facilities, such as test rigs, installations, scientific fleet, etc., under section 07 (including capital expenditures under federal target programs) is performed within the scope of the Federal Investment Program. Putting in operation of unique sites enhances radical modification of experimental base of priority R&D and breakthrough technologies and promotes international cooperation. In view of the importance of the problem, in 1998 the Government decided to provide for investments of at least 5% of total government investments under the "Science" sector whenever it develops a federal (earmarked) investment program. However, budget generation insofar as it concerns government investment under the "Science" Sector continues to be a failure in that investment limits target and the financing program target fail to be met.

Poor structure and lack of transparent information on the budget process results, as far as R&D capital expenditure is concerned, in a situation when it is virtually impossible to assess efficiency of spending both in terms of cost minimization and achieving the objectives of government scientific and technical policy.

4.8. Conclusions and Recommendations

The existing functional budget classification is at variance with the taxonomy of terms and definitions used in the Federal Law "On Science and Government Scientific Policy". Part of expenditures on what is defined therein as "scientific research", "scientific and technological activities", or "experimental activities" are run not through Section 06, but through other sections of the budget classification.

At the same time level three (earmarked items) and level four (types of expenditures) in Section 06 of the functional budget classification are for the most

part determined by a system of departments that have traditionally been responsible for the R&D sector. As a matter of fact, the functional classification at the level in question correlates, if not coincides, with and is even driven by, the departmental one. On the other hand, "non-departmental" earmarked items and types of expenditures are generally either overly aggregated or too narrow.

Thus, the existing budget classification virtually precludes planning and control of expenditures both from R&D regulation purposes and objectives' perspective and from the standpoint of scientific and technological policy priorities as set by the government.

Disadvantages of the budget classification are both a consequence and a form of implementation of the fiscal policy in which budgeting and public expenditures basically aim to support the existing infrastructure of agencies and institutions rather than to achieve objectives and realize government priorities in the R&D sector.

The available data on federal budget funding of R&D are indicative of domination of the departmental approach over targeted approach. Non-departmental (targeted) forms and approaches (such as target programs, grants from research funds, etc.) have been used on a much narrow scale in resource allocation than departmental ones and more often than not have a formal nature.

Analysis of capital expenditures on the R&D is a very difficult task since most of them are not run through the sections of the budget classification related to financing of science.

Recommendations

For the budget process in the area of federal budget funding of R&D to be improved the following measures should be taken in the long and short run:

(i) bringing budget classification in conformity with concepts and terms used in the law on science;

(i) review Section 06 "Fundamental research and promotion of scientific and technological progress" of the budget classification with a view to eliminating departmental bias and reflecting priorities of the state policy vis-à-vis science and technology sector;

(ii) review the budget classification with a view to pooling all capital R&D expenditures to a special Section;

(ii) take measures aimed at development of forms and methods of earmarked financing through the reduction of departmental ones, such as the following:

- increase the share of federal target programs in government financing through reducing "smeta"-based financing of expenses on maintenance of scientific institutions;
- increase the share of targeted budgetary funds of support of science (RFFI, RGNF), and make appropriate amendments in the legislation;
- change over to a system whereby salaries and other operating expenditures of public institutions are predominantly financed at particular customers' expense, including at government customer's expense;
- increase the share of target government contracts, including in expenditures falling under Subsection 0601 "Fundamental Research"

- create incentives for ministries and departments (including state academies of sciences) for a more intensive use of targeted financing forms (target program-based financing, tenders, grants, and government contracts);
- establish a fixed total amount of public expenditures on civil R&D for a medium term;
- introduce a rule whereby distribution of surplus budget revenues appropriated for R&D will be exclusively based on targeted financing forms;
- make a more substantial use of matching grants from the Budget and extra-budgetary sources, in particular through a review of federal target programs;
- reform the system of public institutions to spur the reduction in their numbers (see Fiscal Policy Center Report on accounting for extra-budgetary revenues of public institutions).

5. Institutional Framework of Budget Process in Public R&D Funding

5.1. Setting Priorities in Public R&D Funding

Prioritizing government activities in development of civil science and technologies comes within the scope of the Government Commission on scientific and technological policies headed by the Chairman of the Russian Government. The Commission incorporates officials from different ministries and agencies most of whom are Vice Ministers. The Ministry of Industry, Science and Technologies of the Russian Federation prepares decisions for the Commission.

Lists of priorities in science and technology development and federal level critical technologies were approved by the Commission back in July 21, 1996 and have never been reviewed ever since although over the years a number of new areas have come to the forefront in the world science (e.g. research into the human genome). The set priorities are as a result behind the current development of the world science. At present the Ministry of Science and Technologies is in the process of review of the existing lists of priorities but no decisions have been made so far.

Priorities of scientific and technological policy of the government are in effect set in disregard of the Federal Law "On Science and Government Scientific Policy" N127-FZ of August 23, 1996. For instance, conditions of openness fail to be met. No public discussions, examinations or tenders are held.

Furthermore, scientists are not interested in participating in those efforts since they see no connection between government priorities and actual financing of research institutions and groups. The mechanism of reflecting government priorities in the federal budget lacks transparency (See Section 4). In all likelihood, they are totally disregarded in allocation of most of the expenditures. Therefore, the said lists are not and cannot be a true policy instrument in the science sector.

5.2. Procedure for Determination of Section 06 "Fundamental Research and Promotion of Scientific and Technological Progress" of the government budget for a financial year

Procedures applied in Russia for preparation and adjustment of original budget proposals are dictated by:

- The structure of the federal bodies of government;
- Relationship between their legislated functions and powers (provisions for ministries and departments);
- Regulatory and legislative framework of the budget process;
- The existing practice and informal interaction procedures.

In view of the way science budget is reflected in the budget classification the overriding goal in the field of R&D financing is to form both the combined budget for Section 06 and financial flows to spending agencies. Chart 2 shows the procedure followed in making R&D budget for a financial year. Reflecting all existing information flows on the chart being an extremely difficult task, the Chart shows major decision-making stages making up budget formulation process.

I. Based on basic budget projections the MinFin provides the Ministry of Industry and Science (former MoS) with the data on financing limits under Section 06 and Subsections 0601 and 0602. The procedure for determining budget allocations is established in Government's regulations that envisage preparation of country development forecasts and budget projections, including with a breakdown by direct recipients of funds.

II. Based on requests from ministries and departments the Ministry of Industry and Science puts together proposals on levels of financing of direct recipients of funds under Section 06 with a breakdown by departments and funds for which appropriations are shown as a separate budget line. Proposals thus prepared are passed to direct recipients of funds. The recipients deliver to the MinFin detailed budgets of their expenditures under earmarked items.

III. In parallel, the Ministry of Economic Development and MinFin establish levels of spending on R&D under Federal Target Programs within the amounts earmarked for appropriation for ministries and departments.

IV. Issues that have not been approved at the previous stages are submitted to the Interdepartmental Commission responsible for timely and quality formulation of the budget for a financial year.

V. Once the draft budget law is submitted to the State Duma the budget process moves to the stage of discussion in the Conciliatory Commission of the Federal Assembly and Government. At this stage the Ministry of Industry and Science works with Committees of the legislative branch of government (on science and education, budget, etc.), participates in discussions of amendments, prepares supportive documentation, reference and information materials (Box 5.2).

Box 5.1. Example of determination of budget appropriations for the year 2000

* The maximum amount of R&D funding was set at RUR13.8 bn that amounts to 0.27 percent of the GDP and 1.81 percent of budget outlays (stage I).

* The Interdepartmental Commission decided on the increase of the size of R&D[1] funding by about 4 percent of projected appropriations. As a result the size of appropriations for science was 45 percent up from 1999 level. (stage IV).

* The Reconciliation Commission of the Federal Assembly and Government decided to increase expenditures on R&D. As a result of two rounds of approvals the original projections grew by almost 15 percent while the ultimate size of total expenditures on science amounted to about RUR15 bn, (or 0.28 percent of GDP. This figure was finally included in 2000 budget (stage V).

VI. After adoption of the Federal Budget Law the Ministry of Industry and Science, MinFin, other Ministries and departments adjust their detailed expenditure budgets insofar as they concern objects of spending. Current financing is managed by the Federal Treasury (on a monthly basis) within limits approved by the Government, while the MinFin is responsible for how appropriations will be allocated among, and transferred to, spending agencies.

(Chart 2)

The foregoing procedure for R&D budgeting has the following distinguishing features.

1) Lack of transparency in approval of budget appropriations.

2) Lack of mechanism for reflecting scientific and technological policy priorities in the budget.

3) Process exposure to lobbying by various political and economic groups of interests, especially at the stage of appropriation by the State Duma.

4) Too small a role of the scientific community. Under Duma committees and bodies of the executive branch of government there are public organizations (boards, commissions, etc.) called upon to discuss problems of science and legislative initiatives. So far their role has been small and what they have been doing can hardly be called efficient. To some extent scientists have themselves to blame for it. That too many representatives from among high-ranking officials of academies and ministries sit on public boards and commissions to lobby there exclusively their sectoral interests detracts from their recommendations. Rather than making bodies of government heed the voice of the scientific community, proposals on dramatic budget increases not supported by realistic assessments and meaningful steps to reform the scientific sector itself have an annoying effect on the government.

5) Extra budgetary money is for the most part used to finance academies of sciences and support ministries and departments. Thus, the bulk of additional resources are spent on support of infrastructure rather than within the framework of earmarked financing forms and procedures.

5.3. The problem of status of government agencies

There are significant problems in the field of government R&D funding that stem from the uncertain legal and proprietary status of government agencies and are common to all public sector institutions.

On the one hand, scientific and other research institutions receive funds from the budget that, however, fail to cover all of the needs for their support. On the other hand, those institutions finance a substantial part of their financial needs through income raised from assets (primarily from lease of premises) transferred to them for use (without ownership right) and from performance of paid works under contracts with other organizations.

There is no reliable information about the value and makeup of assets that may serve as an extra-budgetary source of financing of public institutions or about the level of extra-budgetary revenues of scientific institutions including those entered on accounts in the Treasury.

Normally, rights of public institutions to use those assets are established by departmental regulatory acts or executive decisions arbitrarily taken by ministries or departments. Rights of public institutions to collect and spend extra-budgetary revenues have not been clearly defined either. For a more detailed review of those

issues and related recommendations see the Fiscal Policy Center Report on *Accounting of Extra-budgetary Revenues of Government Agencies*.

The uncertain status of State academies of sciences presents a special problem. State academies of sciences are self-governed organizations acting on the basis of their own charters that don't appear to be in full compliance with the existing legislation (in particular, with the Budget Code and Civil Code, etc.). They are responsible for and enjoy a complete freedom in, allocation of resources among different research institutes making up part of their system. The available information is insufficient to judge about the extent to which they take into account scientific and technological policy priorities.

5.4. System of contracts on conducting of applied R&D for government needs

A contractual system is a modern form of organization of scientific activities and an important target for improvement of the way it is funded in Russia. As the international practice has shown, the contract is an effective tool for developing and meeting government demand for R&D results in market-based economies (Box 5.2.). The necessity of the Russian R&D sector evolution to the contractual system stems from that in conditions of financial constraints it is best able to ensure greater value for money from R&D results for the government.

Box 5.2. Contractual system: international experience

A contract as an instrument of regulation in the science sector has been widely used in industrialized countries since 1960s, when cost of development and introduction of new products and technologies began to grow at an accelerated pace. By contrast to the past, when it was looked upon as merely a form of execution of government directives allowing to use (and expand) the research capacity of firms, laboratories, etc., today the contract has largely turned into a mechanism of mutually advantageous cooperation between the government and private firms, universities, and research institutes for achieving technical, scientific, production and any other objectives.

Today the contractual system of allocation of budgetary resources has been extended to virtually all strategic sectors of the economy, while state contracts are awarded subject to the Federal Law "On Supplies of Products for Federal State Needs" through tenders, bidding procedures, quotas, etc. In the scientific sector government contracts are prepared and awarded in accordance with defined priorities through the FTP mechanism. The fact that the contractual system in Russia remained in an almost incipient state until the middle of the 90-s provides a constraint on introduction of a contractual mechanism in the R&D sector. Today contracts and agreements are looked upon as part of civil law and regulated by relevant legislative rules (contracts on R&D have been acknowledged as a separate type of contracts since 1996). Simultaneously with introducing principles and norms of the contractual system accepted in developed countries, Russia has run into problems in other areas of legislation (especially in protection of intellectual property rights) that hamper the efficient use of this instrument, including for the government as a participant in contractual relations.

Development of legislation on organization of tenders for purchases of goods and services for government needs is still in progress. Meanwhile, bodies of the executive branch of government act on the basis of 1997 Presidential Decree “On Initial Measures for Prevention of Corruption and Cuts in Public Expenditures during Organization of Purchases of Products for Government Needs”, rules of organization of purchases and standard sectoral regulations. The applicable regulation in the R&D sector is "The standard regulations for awarding contracts on conducting of research and development and performance of technological works of applied nature for government needs through tenders and other methods of purchases and procedure for conclusion of government contracts" (1997). The preferable way of awarding contracts on R&D thereunder is through open tenders. It provides for other forms of government contract awards such as award of a government contract to a single contractor, through closed tenders, etc. The first such tenders were held back in 1996. Bringing the regulatory framework of contract award system in the R&D sector in conformity with the federal legislation is still in progress. Meanwhile government R&D customers invite tenders, conclude contracts, with training in the use of the contractual system arranged for departmental officials.

Funding of and control over R&D purchases for government needs follow a pattern typically applied for allocation of budgetary resources in Russia. Purchases under awarded contracts are financed within limits specifically established in the federal budget subject to actual inflow of resources. Contracts are funded by MinFin that transfers money to government customers within the limits appropriated (on an itemized basis). The Treasury makes a separate line provision for funds (in projections of expenditure financing limits and budget measures prepared on a monthly basis) for financing of purchases and transfers them to contractors. The responsibility for spending of funds for intended purposes lies with a contractor and government customer of works, while control functions are to be performed by the MinFin and Treasury.

The contractual system used in the R&D sector, to be improved so as to allow to select a bidder that can best perform a particular job on customer’s terms and conditions requires a higher quality of overall budget management and introduction of target-program methods of financial resource distribution (business planning; trail accounting, control, evaluation of results; independent expert assessment at all stages and levels of generation and implementation of programs and projects financed by the government, guarantees of the use of funds for intended purposes, etc.).

The biggest challenge posed in connection with the use of government contracts in the R&D sector is to clearly define government needs and related assignments for R&D. In hiring R&D the government should focus on projects that can bring about breakthroughs in the economy and ensure production of high-tech products. Setting a list of those projects is closely linked to the problem of defining government priorities.

5.5. Control over allocation and use of budgetary resources

Lack of a well-adjusted and well-run system of control over the use of budgetary resources is one of the major weaknesses of the overall budget process in Russia. Experts believe that allocation of budgetary resources within departments strapped by numerous reporting requirements (Box 5.3.) is subject to a very formal control, detracting from the efficiency of the budget process.

Box 5.3. Routine control over financing of federal budget R&D expenditures

The Ministry of Industry and Science is required to report quarterly to the Accounting and Audit Chamber on how priorities set in the budget law for a current year are funded. Funding occurs within limits established monthly by the MinFin from detailed budgets presented by type of expenditure. The limits are then allocated among priorities on the list in accordance with annual appropriations and thereafter approved by the Minister. The information on approved amounts of funding is further on provided to sectoral branches and departments for them to prepare appropriate documents. Funding of expenditure type 187 "Conducting R&D within the FTP framework" is in accordance with contracts. Contract time schedules incorporate two stages that receive monthly advance payments in the amount of 1/12 of the contract value. Funding of expenditure type 216 "Other R&D" takes place on the basis of expenditure budgets of subordinate organizations. Financing of expenditure types 180 "Fund for awards of individual support to leading scientists and scientific schools", 181 "Creation of IT communication systems and data bases of fundamental science and education", 182 "Financing of priority areas of science and technology" is managed through Item "Subventions" with expenditure budgets approved on a project-by-project basis. Payment documents for those expenditures are issued against Ministry of Industry and Science executive orders for appropriation of funds (with their numbers included in registers forwarded to the Main Branch of the Federal Treasury). The Ministry of Industry and Science issues about 250 such orders on a monthly basis.

The Accounting and Audit Chamber, MinFin control and audit units and departments and other bodies of the executive branch of government play a major role in issues of external control. At the same time, audits of the Ministry of Industry and Science undertaken by the Accounting and Audit Chamber have shown that a formalistic approach is sometimes substituted for the true (and therefore useful) analysis. The Accounting and Audit Chamber and other controlling bodies are responsible for financial audit: they check whether funds are spent for intended purposes, procedures for allocation of appropriated resources are followed, and records are properly kept, etc. However, they cannot and are not obliged to carry out a technical audit to find out to what extent targets set in the approved programs are actually met, the degree of completion of programs' implementation, actual scientific and practical results and whether they correlate with government priorities, etc.

Failure to execute budgetary allocations in full or within the established time limits hampers oversight over allocation and use of budgetary resources. Discharge of arrears of payments accumulated by the government under Section 06 both for and during the year and securing more regular disbursements have become a major breakthrough of the last two years. The next in turn should be the objective of ensuring stable disbursements on a quarterly basis.

The Treasury is called upon to play an important role in ensuring control over expenditures. Specific features of the treasury system: item-after-item establishment of expenditure financing limits and budget measures in cooperation with the MinFin; transfer of funds and oversight of their use for authorized purposes are responsible for both its advantages and disadvantages from the R&D funding process perspective. Experience of distribution of public resources through the treasury system indicates that stringent control coupled with overly disaggregated economic classification of expenditure items and monthly appropriations of funds often paralyze normal scientific activities. Although in full control of timeliness, items and amounts of expenditures of research institutions, the Treasury nevertheless cannot guarantee that government obligations will be performed as efficiently. This pushes institutions to use budgetary resources for unauthorized purposes. Illegal spending of funds is

largely driven by excessive regulatory restrictions, imperfect legislation, and lack of adequate information support (monitoring).

Steps have already been taken to address this problem. In 2001 the number of items for which appropriation of funds are made have been reduced. Some of the expenditures are accounted for under Item "Subventions". For managers of institutions to enjoy more discretion needed in planning of scientific activities in view of a unique nature of research process, budget items should be further aggregated. Meanwhile budget appropriations should be made available on a quarterly basis. At the same time ministries should improve the quality of management insofar as it concerns determination (planning) of expenditure items for subordinate organizations, and control over expenditures of the aggregated budget. In addition some experts advise that the treasury should take on specialists that have a good understanding of all the whys and wherefores of financing of each budget sector.

5.6. Conclusions and Recommendations

By and large, the budget process in the field of R&D funding lacks sound institutional framework, with procedures, rights and responsibilities being vague, uncertain and imperfect, and abounds in 'non-transparent zones" and outdated principles and structures. This institutional laxity is responsible for insufficient control exercised by the government over R&D financing process, starting with setting of government policy priorities and all the way down to control over execution of decisions.

The most important institutional problems include:

- Virtual non-existence of procedures for defining and implementing scientific and technological policy priorities;
- closed, non-transparent way of budget appropriations approval;
- budget process exposure to influence of special political and economic interests;
- insufficient and inadequate role played by the scientific community in priority setting and budget process;
- uncertainty of the status of public institutions, state academies in particular;
- lack of correspondence of charters and actual status of the academies to the legislation currently in force;
- unclear scope and makeup of government contracts on R&D;
- imperfect legislation on awards of R&D contracts through bidding, especially insofar as it concerns intellectual property rights;
- exercise of control over spending in the absence of technical audit;
- too detailed budget (*smeta*) items needless for such a special case as the R&D sector.

Recommendations

For a better institutional framework of the budget process in the area of federal budget funding of R&D the following measures should be taken:

(i) arrange a wide-scale public discussion of scientific and technological policy priorities of the government involving contributions from a wide range of experts;

(ii) develop and specify in a Federal Law standing procedures for priority setting and review;

(iii) take an inventory of the assets of public institutions and level and sources of their extra-budgetary revenues, to be followed by a publication of appropriate information;

(iv) take an inventory of departmental regulatory acts establishing procedures for the use of assets of public institutions;

(v) bring the status and charters of state academies of sciences in conformity with the effective legislation (in particular with the Civil Code and Budget Code);

(vi) carry out a reform of the system of government agencies providing for a clear-cut distinction between public institutions financed in accordance with the 'smeta' and other organizations provided with funds and financed on an earmarked basis; changeover to execution of expenditure and revenue budgets of all public institutions through the Treasury system (for more details see the Fiscal Policy Center Report on accounting of extra-budgetary revenues of government agencies);

(vii) develop formal procedures for determining the scope and composition of a government contract on R&D;

(viii) improve legislation on awards of contracts on R&D through tenders, especially to the extent that it applies to intellectual property rights;

(ix) introduce procedures for technical audits as part of control over spending;

(x) prepare scientific institutions' budgets in a more aggregated form while making available budget appropriations on a quarterly basis (allowing an institution's management flexibility in moving resources from one item to another within aggregated financing limits is equivalent to budget aggregation).

6. Major problems of government financing of fundamental research and promotion of scientific and technological progress and recommendations on how to solve them

The analysis of the situation in the field of civil R&D funding from the federal budget has shown that that many of the problems are not current but fundamental and deeply rooted in the past history. Many of them stem from approaches inherited from the R&D management system that had been in place in the USSR. Any attempts to work out recommendations on current budget planning will inevitably run into those fundamental problems that are still outstanding. Hence, building of measures for improvement of the budget process in the scientific sector should proceed from "general and long-term recommendations" down to "particular and short-term ones".

Later in this Section subsections will deal each with a large problem or a group of problems calling for a number of measures to be taken both in the long and short run.

6.1. Lack of clearly set objectives of government interventions in the R&D sector

A strongest case for government intervention in the civil science and R&D sector from the standpoint of the economy is to ensure a stronger competitive edge of the national economy within the framework of international division of labor. However, the above objective of state aid provision to science in Russia has not been yet formulated as a government priority or government policy objective. Moreover, to a certain extent it runs counter to the proclaimed priority of the fundamental research support over aid to applied science.

How much government regulation methods currently in use are effective in ensuring a higher competitive strength of national economy is yet to be determined. However, it is not improbable that indirect incentives such as tax breaks that are already in use will ensure a much more efficient support of the R&D sector than does direct financing by the government. But the currently accepted method of accounting for budget revenues and expenditures prevents tax incentives from being included in budget expenditures making it difficult, if at all possible, to analyze the efficiency thereof as a regulation tool in the science sector.

In the Russian society there are widely spread sentiments in favor of political reasons behind state support of science such as building up national defense potential, preservation and development of national culture, and maintenance of national prestige. These have not been formally established as special objectives of government activities in the field of science and generally have an informal impact on decision making, resulting in that science is overshadowed by politics and paving the way to lobbying by narrow groups and corruption.

Recommendations

(iii) identify government priorities vis-à-vis science and objectives of government intervention in the science sector (refer also to Section 6.4).;

(iv) make a more in-depth analysis of the existing forms of state support from the standpoint of their efficiency in enhancing the competitive strength of national economy;

(v) make amendments to the budget classification of revenues to account for tax revenue shortfalls resulting from sectoral tax breaks (such as R&D expenditure deductions for tax purposes) as earmarked budget revenues intended for R&D funding.

(vi) establish formally a limited list of political reasons for government intervention in the science sector;

(vii) make out a limited list of facilities subject to government financing by reason of national prestige support;

(viii) formalize a process of taking into account political reasons for government financing of research activities.

6.2. Lack of clear-cut concepts and terms used in government R&D regulation

Concepts and terms used in effective regulatory acts in the filed of government regulation of the R&D sector differ widely and are often incompatible. In particular, there is difference in terms used in:

- federal legislation on science;

- budget classification;
- sectoral regulatory acts;
- official statistics.

Recommendations

In the short run:

(iii) make an inventory and taxonomy of concepts and terms pertaining to state regulation of the R&D sector and used in regulatory acts and public administration; eliminate most obvious contradictions.

In the medium and long run:

(iv) develop uniform terminology in the area of state regulation of the R&D sector;

(v) bring regulatory acts and government procedures in conformity therewith.

6.3. Imperfect functional budget classification

The third (earmarked items) and fourth (types of expenditures) levels of the functional budget classification in Section 06 "Fundamental research and promotion of scientific and technological progress" are of a clearly departmental nature, with no matching ensured between budget classification items and policy priorities vis-à-vis science and technology sector.

Recommendations

(iii) review Section 06 "Fundamental research and promotion of scientific and technological progress" of the functional budget classification to eliminate departmental bias and accommodate priorities of the state policy vis-à-vis science and technology sector;

(iv) review the budget classification with a view to pooling all capital R&D expenditures into a special Section (or Subsection of Section 06).

(v) Account for extra-budgetary revenues of public scientific institutions as earmarked federal budget revenues intended for funding of appropriate institutions (as part of a broader reform of the system of public institutions).

(vi) Account for R&D expenditure deductions for tax purposes as earmarked budget revenues intended for R&D financing (refer also to 6.1).

6.4. Indeterminacy of the system of state priorities in the R&D area

At present regular reviews and updates of government priorities in the field of scientific and technological development and, accordingly, in state support of R&D are practically non-existent. Whatever actual efforts are taken to identify priorities they are of a departmental and closed nature.

The mechanism of accommodation of government priorities in the federal budget is altogether nontransparent.

Recommendations

In the short run:

(i) organize a wide-scale public discussion of priorities of government policy vis-à-vis science and technology sector involving a wide range of experts.

In the medium and long run:

(ii) develop regular procedures for selection and review of priorities;

(iii) specify those procedures in a federal law;

(vii) review the existing functional classification of budget expenditures (see 6.3).

6.5. Uncertain status of extra-budgetary revenues of public institutions; uncertain legal status of academies

At present there is no reliable information about the value and makeup of assets that may serve as an extra-budgetary source of financing of scientific (public) institutions or about the level of extra-budgetary revenues of scientific institutions including those entered on accounts in the Treasury.

Rights of public institutions to use revenue-generating property are established by departmental regulatory acts or executive decisions arbitrarily taken by ministries or departments. The existing contradictions between the Budget Code and Civil Code leave room for different interpretations of the status of extra-budgetary revenues of public institutions. Those uncertainties should be eliminated in the course of reform of public institutions the basic principles of which are set out by the Ministry of Finance of the Russian Federation in the Concept of fiscal policy in the field of expenditures.

State academies of sciences have an uncertain legal status that cannot be deemed totally compliant with the existing legislation (in particular, with the Budget Code and Civil Code, etc.).

Recommendations

In the short run:

(i) make an inventory of the assets of public institutions and level and sources of their extra-budgetary revenues, to be followed by a publication of appropriate information;

(ii) make an inventory of departmental regulatory acts establishing procedures for the use of assets of public institutions, with subsequent publication of appropriate information;

(iii) bring the status and charters of state academies of sciences in line with the effective legislation (in particular with the Civil Code and the Budget Code).

In the medium and long run:

(iv) carry out a reform of the system of public institutions providing for acknowledgement of all extra-budgetary revenues of public institutions as Budget revenues to be fully or partially used for targeted financing of appropriate public institutions in accordance with expense and revenue budgets (*smeta*) (for more details see Center of Fiscal Policy proposals on accounting of extra-budgetary revenues of public institutions).

6.6. R&D expenditure funding from the government budget

Government financing of R&D to a larger extent aims to maintain the existing infrastructure of scientific organizations rather than to obtain scientific results.

Targeted financing principle has not been adequately used, with related procedures (target program-based financing, a system of tenders and contracts, and grants) being often too formal.

Recommendations

In the short run:

(i) increase the share of federal target programs in government financing through reducing smeta-based financing of expenses on maintenance of scientific institutions; a change-over from funding of institutions to funding of scientific research programs should be evolutionary but must begin as soon as possible;

(ii) increase the share of targeted budgetary funds of support of science (RFFI, RGNF), and make appropriate amendments in the legislation;

(iii) change over to a system whereby salaries and other operating expenditures of public institutions are predominantly financed at customers' expense (reduction of the share of government financing under Section 110100 "Remuneration of Labor of State Employees" based on objects of spending).

In the medium and long run:

(iv) introduce a rule whereby distribution of surplus budget revenues appropriated for R&D will be exclusively based on targeted financing;

(v) account for tax incentives applicable to R&D financing as earmarked budget revenues intended for science funding;

(vi) reform the system of public institutions to bring about, *inter alia*, a reduction in their numbers through voluntary movement of some of them to a non-public sector; it is important that all extra-budgetary revenues of organizations that will retain their status of public institutions are recognized as Budget revenues that are fully or partially intended for financing the activities of public institutions (refer to 6.5);

(vii) create incentives for ministries and departments (including state academies of sciences) for a more intensive use of targeted forms of financing (target program-based financing, tenders, grants, and government contracts);

(viii) make a more substantial use of matching grants from the Budget and extra-budgetary sources;

(iv) increase the share of earmarked government contracts, including in expenditures falling under Subsection 0601 "Fundamental Research".

6.7. Control over allocation and use of budgetary resources

No technical audit is undertaken as part of control over spending of funds to monitor actual progress of approved programs' implementation, extent to which their

targets are met, actual scientific and practical outputs (if any) and how they correspond to government priorities, etc.

Too detailed items of budgets (*smeta*) put together for monthly appropriations of funds are needless for such a special case as the R&D sector and provoke scientific organizations to use budgetary resources for unintended purposes.

Recommendations

In the short run:

(i) prepare scientific institutions' budgets in an aggregated form while ensuring that Budget appropriations are made available on a quarterly basis.

In the medium and long run:

introduce technical audit procedures to be followed in exercising control over spending.

Major problems of government financing of R&D and proposals on how to improve budget process

Problems	**Proposals and Recommendations**	
	Short term	**Medium and long term**
Lack of clearly set objectives of government interventions in the R&D sector.		
A strongest case for government intervention in the civil science and R&D sector from the standpoint of the economy is to ensure a stronger competitive edge of the national economy within the framework of international division of labor. It runs counter to the proclaimed priority of the fundamental research support. How much government regulation methods currently in use are effective in ensuring a higher competitive strength of national economy is yet to be determined. However, it is not improbable that indirect incentives will ensure a much more efficient support of the R&D sector than does direct financing by the government.	account for tax revenue shortfalls resulting from R&D expenditure deductions for tax purposes as earmarked budget revenues intended for R&D funding	Government priorities in the field of science development are to be specified in a law. Stronger competitive position of the Russian economy should be acknowledged as the primary (or one of the primary) policy goal(s) in the sector; make a more in-depth analysis of the existing forms of state support from the standpoint of their efficiency in enhancing the competitive strength of national economy;

Problem	**Proposals and Recommendations**	
In the Russian society there are widely spread sentiments in favor of political reasons behind state support of science such as strengthening of nation's defense potential, preservation and development of national culture, and maintenance of national prestige. These have not been formally established and expressly proclaimed as special objectives of government activities in the field of science and commonly have an informal impact on decision making, which results in science being overshadowed by politics and paves the way to lobbying by narrow groups and corruption.		establish formally a limited list of political reasons for government intervention in the science sector; make out a limited list of facilities subject to government financing by reason of national prestige support; formalize a process of taking into account political reasons for government financing of research activities

Lack of clear-cut terms and definitions used in government regulation of R&D		
Terms and definitions used in effective regulatory acts in the field of government regulation of the R&D sector differ widely and are often incompatible. In particular, there is difference in terms used in: - Federal legislation on science; - budget classification; - sectoral regulatory acts; - official statistics.	make an inventory and taxonomy of terms and definitions pertaining to government regulation of the R&D sector and used in regulatory acts and public administration; eliminate most obvious contradictions.	develop uniform terminology in the area of government regulation of the R&D sector; bring regulatory acts and government procedures in conformity therewith.
Imperfect functional budget classification		
A virtually departmental nature of the third (earmarked items) and fourth (types of expenditures) levels of the functional budget classification. Absence of any link between classification items and government policy priorities vis-à-vis science and technology sector. A major part of capital expenditures are not run through Sections of the budget classification that have to do with R&D funding		review Section 06 "Fundamental research and promotion of scientific and technological progress" of the functional budget classification to eliminate departmental bias and accommodate priorities of the government policy vis-à-vis science and technology sector; review the budget classification with a view to pooling all capital R&D expenditures to a special Section.

Indeterminacy of the system of state priorities in the R&D area		
Non-existence of regular reviews and updates of state priorities in the field of scientific and technological development and, accordingly, in state support of R&D. Procedures for identification of priorities are of a departmental and closed nature. The mechanism of reflection of government priorities in the federal budget is nontransparent.	organize a wide-scale public discussion of priorities of government policy vis-à-vis science and technology sector involving a wide range of experts.	develop regular procedures for selection and review of priorities; specify those procedures in a federal law; review the existing functional budget classification (see above).
Uncertain status of public institutions;		
There is no reliable information about the value and makeup of assets that may serve as an extra-budgetary source of financing of public institutions or about the level of extra revenues including those that are legally collected.	make an inventory of the assets of public institutions and level and sources of their extra-budgetary revenues; publish related information;	carry out a reform of the system of government agencies providing for a clear-cut distinction between public institutions financed in accordance with the 'smeta' and other organizations provided with funds and financed on an earmarked basis; (for more details see the Fiscal Policy Center Report on accounting of extra-budgetary revenues of government agencies).
Rights of public institutions to use revenue-generating property are established by departmental regulatory acts or executive decisions arbitrarily taken by ministries or departments. State academies of sciences have an uncertain legal status that cannot be deemed totally compliant with the existing legislation (in particular, with the Budget Code and Civil Code, etc.).	make an inventory of departmental regulatory acts establishing procedures for the use of assets of public institutions; publish related information; Bring the status and charters of state academies of sciences in line with the effective legislation (in particular with the Civil Code and the Budget Code).	

R&D expenditure funding from the government budget		
• Government financing of R&D is largely aimed at maintaining the existing infrastructure of scientific organizations rather than at obtaining scientific results. • Targeted financing principle has not been adequately used, with related procedures (target program-based financing, a system of tenders and contracts, and grants) being often too formal.	• increase the share of federal target programs in government financing through reducing 'smeta'-based financing of expenses on maintenance of scientific institutions; • increase the share of targeted budgetary funds of support of science (RFFI, RGNF), and make appropriate amendments in the legislation; • change over to a system whereby salaries and other operating expenditures of public institutions are predominantly financed at particular customers' expense (reduction of the share of government financing under Section 110100 "Remuneration of Labor of State Employees" of the economic classification); • establish a fixed total amount of public expenditures on civil R&D for a medium term; • introduce a rule whereby distribution of surplus budget revenues appropriated for R&D will be exclusively based on targeted financing forms;	• reform the system of public institutions to spur the reduction in their numbers (see above); • create incentives for ministries and departments (including state academies of sciences) for a more intensive use of targeted financing forms (target program-based financing, tenders, grants, and government contracts); • make a more substantial use of matching grants from the Budget and extra-budgetary sources; • increase the share of earmarked government contracts, including in expenditures falling under Subsection 0601 "Fundamental Research". .

Control over distribution and use of budgetary resources		
• lack of technical audit in the course of control over spending of funds;		• introduce procedures for technical audits as part of control over spending
• Budget items are too detailed, which is needless for the R&D sector	• prepare scientific institutions' budgets in a more aggregated form while making available budget appropriations on a quarterly basis	